The role of social capital in the resilience of self-help settlements: The case of Nezahualcóyotl in the metropolitan area of Mexico City

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Declaration of ownership

I, Manuel Alejandro Rivero Villar confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature

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Abstract

This thesis investigates the contribution made by networks of social capital to the resilience of self-help settlements (settlements self-produced by low-income groups lack-ing adequate infrastructures and services, often occupying areas of high risk) at the mu-nicipal scale. Self-help settlements are considered intrinsically vulnerable to the ef-fects of climate change, and are foreseen to be the predominant form of urbanisation in the Global South for the 21st century. The UN's recent adoption of the 'Sustainable Devel-opment Goals' placed the resilience (the continued adjustment in the face of en-viron-mental uncertainties) of self-help settlements at the top of the global development agen-da. Central to urban resilience is the concept of social capital, which refers to the rela-tions of trust and reciprocity embedded in social networks that enable them to act col-lectively. In the context of urban resilience, social capital can explain how social groups organise from the bottom to forward community development goals to overcome the sources of their vulnerability. This investigation takes as a case-study the social net-work involved in the achievement of the collective goals (municipal independence, land ten-ure rights, water supply, drainage, public transport, and paved streets) that allowed *Nezahualcóyotl*, a self-help settlement in the metropolitan area of Mexico City, to over-come its vulnerabilities (the settlement is located on the drained bed of a salty lake, prone to flooding and sand storms, and lacked an adequate institutional framework). *Nezahual-cóyotl* is considered as a successful example in which citizen participation was key in forwarding the development of the settlement. This thesis uses a mixed-method approach (Social Network Analysis and thematic analysis), and tracks longitudinally the evolution of the case-study (1953-1986). The main finding of this research is that net-works of so-cial capital contribute to the resilience of self-help settlements through the engagement of their members in monitoring the challenges faced by the settlement, and producing per-tinent adjustments relying on collective action. This is made possible by the capacity of the members of networks of social capital to remain active for long peri-ods of time, and to make productive use of different configurations of social capital within the network, in response to emerging threats and changing circumstances.

Impact statement

Over the last century, global demographics changed dramatically, which meant that in 2007 more than fifty percent of the population lived in cities for the first time in history. According to international development narrative, growing urbanisation would have a great impact in reducing global poverty, and improving the quality of life of bil-lions of people (UN-Habitat, 2017). Nevertheless, urban growth has occurred in many parts of the Global South without adequate planning and without construction of the necessary infrastructures to provide basic urban-life standards. According to UN figures (World Bank, 2017), it is estimated that over a billion people currently live in self-help settlements. This figure is expected to double by 2030 (World Bank, 2017). At the same time, the dangerous effects of global climate change are expected to be felt in a dispro-portional way in the Global South. The combination of the dangers of climate change, and unprecedented rapid urbanisation in the form of self-help settlements will exacer-bate the effects of climatic extremes in urban areas of the Global South. These issues have recently been incorporated at the top of the global public policy agenda, as part of the United Nations' Sustainable Development Goals, calling for the resilience of self-help settlements. This implies that the planning community will have to actively engage with improving the resilience of self-help settlements.

This research aims to provide an example of how a self-help settlement overcame the causes of its vulnerability to achieve resilience through the engagement of the popu-lation in networks of social capital. It is expected that the impact of the results of this investigation will be twofold. First, findings of this research will challenge the predomi-nant notion in academia, that self-help settlements as intrinsically vulnerable. Second, the results of this research, and those of future academic enquiry influenced by this in-vestigation will provide empirical evidence about the mechanisms used by urban popula-tions to forward the resilience of self-help settlements, which will be useful in informing future policy-making for the resilience of self-help settlements.

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Acronym	Definition
CEAS	Commission on Water and Sanitation of the State of Mexico (*Comisión Estatal de Aguas y Saneamiento*).
CCA	Climate Change Adaptation
CIDNE	Centre of Information and Documentation of Nezahualcóyotl City (*Centro de Información y documentación de Nezahualcóyotl*).
CNOP	National Confederation of Popular Organizations (*Confederación Nacional de Organizaciones Populares*). CNOP is a political group belonging to the Institutional Revolutionary Party.
CONAPO	Mexico's National Population Council (*Consejo Nacional de Población*).
CSRM	Council of the Settlers Restoration Movement (*Consejo del Movimiento Restaurador de Colonos*). CSRM is the steering committee of the social movement that forwarded the achievement of secure land tenure in Nezahualcóyotl City.
DDR	Disaster risk management
DOF	Mexico's Official Journal of the Federation (*Diario Oficial de la Federación*).
FINEZA	Trust of Nezahualcóyotl City (*Fideicomiso de Ciudad Nezahualcóyotl*). FINEZA is a trust set by the government of the State of Mexico to operate the regularisation of Nezahualcóyotl's land tenure.
ICA	Civil Engineers and Associates (*Ingenieros Civiles y Asociados*). ICA is one of the largest construction companies in Mexico.
INECC-Semarnat	National Institute of Ecology and Climate Change - Ministry of the Environment and Natural Resources (*Instituto Nacional de Ecología y Cambio Climático - Secretaría de Medio Ambiente y Recursos Naturales*).
INEGI	National Institute of Statistics and Geography (*Instituto Nacional de Estadística y Geografía*).
OECD	The Organisation for Economic Co-operation and Development
ONS	Office for National Statistics
PRI	Institutional Revolutionary Party (*Partido Revolucionario Institucional*). PRI is one of the largest, and oldest political parties in Mexico.
REPSA-UNAM	Natural reserve of Pedregal de San Ángel - National Autonomous University of Mexico (*Reserva ecológica del Pedregal de San Ángel – Universidad Nacional Autónoma de México*).
SC	Social Capital
SD	Sustainable development
SEDESOL	Mexico's Ministry of Social Development (*Secretaría de Desarrollo Social)*.

Acronym	Definition
SNA	Social Network Analysis
SRM	Settlers Restoration Movement (*Movimiento Restaurador de Colonos*). SRM is the movement that forwarded the achievement of secure land tenure in Nezahualcóyotl City.
UGOCEM	The General Union of Workers and Farmers of Mexico (*Unión General de Obreros y Campesinos de los Estados de México*). UGOCEM is a national left-wing farmers and workers union.
UCINET	Computer's package for the analysis of social network data
UER	Urban Ecological Resilience
UN	United Nations
UN DESA	United Nations Department of Economic and Social Affairs
UNGA	General Assembly of the United Nations
UN-Habitat	United Nations Human Settlements Programme
UNISDR	United Nations Office for Disaster Risk Reduction
UNISDR	United Nations

1. Introduction

One of the greatest challenges for contemporary planning practice is delivering responses to the accelerated growth of poorly planned urban areas of the Global South1 interacting with the effects of climate change. These concerns figure at the top of the development agenda for the 21st century (UNGA, 2015). The Global South's urbanisation has being largely produced in the form of self-help settlements2, which is expected to be the predominant form of urbanisation in developing countries for the 21st century (UN-Habitat, 2006). Self-help settlements are produced by their own inhabitants (Gilbert, 2007; Platt, 2010), in many cases, *"without the needed expansion in the services and facilities essential to a healthy urban environment, especially the provision of water, sanitation, drainage and solid waste management"* (Satterthwaite, 2013b, p. 310). Self-help settlements often occupy areas of high risk (e.g. flood-prone, and landslide-prone), and are inhabited by low-income groups (Hardoy & Romero Lankao, 2011). These characteristics make them intrinsically vulnerable to climate change effects (Hardoy & Romero Lankao, 2011; Romero Lankao & Qin, 2011; Satterthwaite, 2013c).

It is in these areas where the dangerous effects of climate change (increased severity and frequency of extreme weather events, extreme temperatures, air pollution, extreme rainfall, sea-level rise, landslides, and flooding among others) are expected to impact the most (Hardoy & Romero Lankao, 2011; Satterthwaite, 2013c). This calls for a better understanding of how resilience can be improved in those vulnerable areas. The sources of vulnerability of self-help settlements (lack of services, infrastructures, and capacities for organising urban growth) are also identified as targets for community development (Gilbert, 2013; Satterthwaite, 2013b). Thus, increasing cities' resilience in general, and self-help settlements, is one of the main development challenges to be addressed by practitioners and policy makers for the years to come (Beall, Guha-Khasnobis, & Kanbur, 2010; B. Cohen, 2006; UN DESA, 2014). This concern has been ratified by the recent adoption of the 'Sustainable Development Goals' by the General Assembly of

1 "'Global South' refers to developing or poor countries in general" (Alcadipani, Khan, Gantman, & Nkomo, 2012)

2 In this thesis the term self-help settlement is selected to describe the type of urbanisation observed in Neza, the case-study of this research instead of other terminologies that are rife in academia to describe similar cases (e.g. slum, favela, shanty town, and informal settlement among others). The rational for the selection of the term self-help settlement is two-fold. First, as has been discussed in the literature (Azuela de la Cueva, 1993; Gilbert, 2007; Varley, 2013), terminologies often used to refer to urban areas such the case studied in this thesis, tend to fail to address the complexity of such settlements. For example, following Varley's (2013) argument, studies of urban informality tend to focus on the lack of all sorts of services and infrastructures, and furthermore tend to portray cities of the south in a simplistic dichotomy of formal/informal. Furthermore, referring to a settlement such as Neza either as a shanty town, informal settlement, illegal settlement, or slum without considering the nuances of each case, might obscure significant information of the settlement at hand (Gilbert, 2007). The term "self-help" describes a longitudinal and incremental building process of structural and material change (Turner, 1968 cited by Varley, 2013), in which settlements can and must be improved through the operation of its inhabitants and authorities (Gilbert, 2007). Thus, in this thesis the term self-help settlement was selected to describe Neza because it stresses the main features of Neza's urbanisation in relation to the theoretical framing of this investigation. That is, on one hand the definition of urban resilience used in this thesis sees it as an incremental process, in which cities continuously adjust in an evolutionary fashion through their history in the face of environmental uncertainties and nonlinearities. On the other hand, as demonstrated in chapters 4, 5, 6, 7, and 8, Neza's process of urbanisation and progressive improvement was achieved by the solidarity and collaboration of its own residents organised from the bottom-up. As such, it is considered that the terminology of self-help settlement better describes the process of urbanisation of Neza. Second, selecting the terminology of self-help settlement to describe Neza relates to the positionality of the author of this investigation, as he believes that other terminologies tend to disenfranchise self-help settlement inhabitants (See: Gilbert, 2007; Varley, 2013) (a reflection on the positionality of the author of this thesis is offered in Chapter 3).

the United Nations. Goal 11 ‘Make cities and human settlements inclusive, safe, resilient and sustainable’; and 13 ‘Take urgent action to combat climate change and its impacts’; recognise the urgent need to generate global responses for the effects that climate change might have in self-built settlements (UNGA, 2015).

The resilience concept has its origins in ecology (Holling, 1973). Developed by Holling (1973), resilience has travelled across multiple disciplines. In urban planning studies, two understandings of resilience coexist. One focuses on the capacity of cities to withstand and resist environmental or man-made shocks and return to a previous state in an efficient and timely manner (engineering resilience) (Adger, 2006; Adger et al., 2009; Davoudi, 2012; Fünfgeld & McEvoy, 2012). The second understanding, which is the one used in this thesis, sees resilience as the continued adjustment of cities in an evolutionary fashion through their history (Adger, 2000; Pickett, Cadenasso, & Grove, 2004) in the face of environmental uncertainties and nonlinearities (Leichenko, 2011). From this perspective, urban resilience depends on cities’ ability to transform in relation to those factors driving vulnerability and risk (Bahadur & Tanner, 2014) (i.e. not returning to a previous state). Societies have inherent capacities to overcome the effects of climate change, which are bound up with their ability to act collectively (Adger, 2003). Thus, urban resilience recognises a social dimension as central to explain how the inhabitants of a city can act collectively in identifying the sources of their city’s vulnerability, and put in place pertinent actions to increase the resilience of the city (Adger, 2003; Ahern, 2011; Davoudi, 2012; Shaw, 2012).

Within the social dimension of urban resilience one element stands out: social capital. Social capital is recognised in urban resilience as an important component under which social groups adapt to environmental change, relying on the existence of trust and reciprocity among their members, and on their capacity to build social networks to act collectively against the effects of climate change (Adger, 2000). Social capital refers to the social rules of trust and reciprocity embedded in social networks that enable them to act collectively (Bourdieu, 1989; Coleman, 1988; Putnam, 2000). In the context of urban resilience, social capital can explain how social groups living in self-help settlements organise from the bottom to create *“pressure and partnerships for enhanced urban resilience”* (Bahadur & Tanner, 2014, p. 204), focusing on achieving community development goals (e.g. accessing adequate services and infrastructures) to overcome the sources of their vulnerability (Gilbert, 2013; Satterthwaite, 2013b).

Social capital entails that social networks have value, which resides in the capacity of social networks to achieve common goals collectively, that in its absence could not be possible (Bourdieu, 1989, 2008 [1986]; James S. Coleman, 1988; Putnam, 2000b). The concept has been of great influence in social sciences because of its explanatory value with regards to the ways social groups overcome inaction and act collectively in achieving common objectives (Fox, 1996). The concept of social capital has two dimen-

sions: structure (networks), and operation (J. S. Coleman, 1990; Lollo, 2012). Social networks are patterns of repeated interaction between members of social actors (DeFilippis, 2001). The operation of social networks is explained by the norms of trust and reciprocity, which enable their members to pursue common objectives (Lollo, 2012; Putnam, 1995a, 2000b; Woolcock & Narayan, 2000). Three fundamental types of social capital exist in the literature, which refer to different types of social networks and the function they provide (Sabatini, 2006). Those types of social capital are: bonding (links homogeneous groups, and serves to cope with everyday life challenges) (De Souza Briggs, 1997; Putnam, 2000a; Rydin & Holman, 2004); bridging (extra-community links allow groups to share information and act collectively towards shared objectives) (Durlauf, 2002; Woolcock & Narayan, 2000); and linking (vertical connections between different groups of wealth and power which play a special role in community development) (Putnam, 2004; Woolcock, 1998).

Linking social capital is important for the development of communities (Grootaert & Woolcock, 1997), as it explains relationships of exchange between parties that are unequal in their access to resources. This is often the case in development work, where external agencies (international or the state) interact with poor communities, endeavouring to achieve mutually agreed beneficial goals, despite their differences (Szreter, 2002). However, according to Putnam (2000b), social capital has been located fundamentally in non-confrontational, and rather apolitical social networks . This interpretation seems contradictory with its alleged role in development (Simon, 2010; Szreter, 2002), and in general for any type of transformation, since transformation requires to challenge the status quo (DeFilippis, 2001).

1.1 The role of social capital in resilience

The role of social capital in resilience is related with its explanatory possibilities of community engagement for acting collectively to reduce their vulnerability, as a form of adaptation to climate change (Bahadur & Tanner, 2014, pp. 204-205; Endfield, 2012). As noted by Tyler and Moench (2012), it is important that groups can self-organise to respond collectively to environmental hazards.

The literature has engaged in multiple forms with the analysis of the role of social capital in resilience (both engineering, and ecological understandings). Social capital has been used to explain the process of ecosystems co-management at the regional scale (Adger, Brown, & Tompkins, 2005; Kizos, Detsis, Iosifides, & Metaxakis, 2014). Other studies looking at the regional scale (Adger, 2000) exemplify the complex interaction between economic and institutional transformations, and the coping abilities of social networks (Adger, 2000). Others have taken a historical perspective to unveil the complex interactions between environment and society, where climatic stressors served as opportunities to learn and innovate (Endfield, 2012). City scale perspectives have looked at

how environmental impacts can trigger local and endogenous social processes that can provide sources for learning and experimentation for governance transformation (Pelling & Manuel-Navarrete, 2011). Other studies, for example Bahadur and Tanner (2014), have argued that the differentiated effects of building protective infrastructures in some parts of a city, and not in other parts of the city, can increase the resilience of the first and worsen the vulnerability of the other. They study the class-differentiated outcomes in resilience while analysing how the construction of flood protective infrastructures in a rich neighbourhood, while increasing its resilience, pushed flooding waters to a poor neighbouring area, increasing its vulnerability. From a similar perspective, others have considered how the burdens of environmental vulnerability are unevenly distributed in cities. While rich neighbourhoods tend to be located in safer areas of cities, poor areas tend to be in more vulnerable parts (Ernstson et al., 2010).

Regardless of the scale of the analysis of urban resilience, Béné et al. (2017, p. 14) note that the urban resilience literature fails to address *"more explicitly the needs and interests of the most marginalized and disenfranchised urban groups"*. Furthermore, the literature tends to deem self-help settlements as locked-in in a poverty cycle, which prevents them from facing the sources of their vulnerability (Hardoy & Romero Lankao, 2011; Romero Lankao & Qin, 2011; Satterthwaite, 2013c). The current international development agenda calls for addressing the very issue of the resilience of self-help settlements, despite the scarce literature, and the idea (emerging from such literature) that the resilience of self-help settlements is not achievable. Thus, the objective of this research is to advance the understanding of the resilience of self-help settlements by looking into the social dimension of the urban resilience framework. Specifically, this thesis explains the contribution of networks of social capital to the resilience of self-help settlements.

1.2 Research questions

This thesis aims to contribute to the understanding of the role of networks of social capital to the resilience of self-help settlements facing challenging environments. In order to do so, this research focuses on the explanatory possibilities offered by the concept of social capital, to understand how social networks located in self-help settlements mobilise social capital into actions aimed at improving infrastructures and institutions for the development of the community (Woolcock & Narayan, 2000) in response to environmental and institutional challenges. This sheds light on the assertion that social capital is a normatively desirable feature to create opportunities for self-organisation and partnerships of collaboration to collectively deal with stressors (Daniel P. Aldrich & Meyer, 2015). Thus, the question that guides this research is: Why do networks of social capital contribute to the resilience of self-help settlements?

The answer to this question explains the contribution of networks of social capital to the resilience of self-help settlements. Given that the goal of this research is to explain the resilience of self-help settlements through the theoretical lens of social capital, then it is necessary to acknowledge both of its dimensions (structure, and operation (see: Lollo, 2012)) in order to provide a comprehensive explanation. Thus, both dimensions of social capital are considered in the main research question; and are examined in turn through two sub-questions, one exploratory, and the other explanatory.

The exploratory sub-question of this research is: What network structure supports the operation of social capital for the resilience of self-help settlements?

Answering this question has four objectives. First, to locate the actors that collaborate with each other to achieve their collective goals in response to environmental, and institutional challenges that their community faces, and forward the resilience of self-help settlements. Second, to locate the collective goals related to the engagement of actors into social networks (López-Marrero & Tschakert, 2011). Third, to identify potential interview participants to answer the second sub-question of this research. Fourth, to understand the structural patterns of interaction that support the achievement of collective goals for the resilience of self-help settlements. The fourth objective of this sub-question sheds light on the structural dimension of social capital.

The explanatory sub-question of this research is: How do networks of social capital operate for the resilience of self-help settlements?

This sub-question qualitatively explores in depth whether and how people work with others on joint projects (Dudwick, Kuehnast, Jones, & Woolcock, 2006) in response to the environmental and institutional problems affecting self-help settlements. The answer to this sub-question unveils how social networks operate to mobilise resources for their settlement and achieve their collective goals, allowing them to deliver urban resilience. This sub-question focuses on the operational dimension of social capital.

1.3 Research approach

This thesis explores the role of networks of social capital in the resilience of self-help settlements taking a case-study approach. The case-study is Nezahualcóyotl City (Neza, in short), a self-help settlement located in the metropolitan area of Mexico City. Neza is recognised as a successful case in which the collective actions of its inhabitants addressed the multiple hazards that the settlement faced, both environmental (the settlement is located on the drained bed of a salty lake, prone to flooding and sand storms), and institutional (the area suffered from the absence of accountable governmental institutions), enhancing the resilience of the settlement (UN-Habitat, 2003). The approach of the research is longitudinal, given that the investigation tracks the evolution of the case-study, from the birth of the settlement in the 1950s, to its consolidation in the 1980s. The

answer to both research sub-questions is provided by using two complementary methods. First, the structure of the network is investigated using the theoretical and methodological procedures of Social Network Analysis (SNA). Data was collected relying on archive mining. The operation of the network is explained from the perspective of participants of the social network, relying on semi-structured interviews. Data was analysed using thematic analysis. The methodology used in this thesis is discussed in detail in Chapter 3.

1.4 Key argument of the thesis

The key argument of this thesis is that networks of social capital contribute to the resilience of self-help settlements because their participants monitor longitudinally the sources of the environmental and institutional vulnerability of the settlement, develop collective goals to tackle vulnerability, and act collectively to achieve them. Achieving collective goals depends on the ability of social networks' participants to create partnerships, both at the interior of the settlement and at its exterior, to mobilise the kind of resources required for the achievement of a particular goal. Furthermore, creating intra- and extra-community partnerships depends on the relations of trust and reciprocity that actors share with each other. These relations can be a-political, and political. The longitudinal operation of social networks depends on the maintenance of ties of trust and reciprocity across the network. Furthermore, the structure of networks of social capital (interaction of different types of social capital) fluctuates through time, according to the changing circumstances that the settlement experiences. In sum, the contribution of networks of social capital to the resilience of self-help settlements is monitoring the threats that the settlement faces, and creating pertinent adjustments to increase the wellbeing of its inhabitants.

This thesis contributes to knowledge in the following ways. First, it questions the rooted conceptualisation of self-help settlements as irremediably vulnerable. Second, it provides empirical evidence on some of the mechanisms available to poor communities to achieve resilience. This thesis also makes some theoretical contributions to the literature on social capital. By recognising culturally-embedded practices in the operation of social networks, as forms of trust and reciprocity, this thesis forwards the understanding of social capital in the Mexican context. This thesis also contributes to the understanding of the role of social capital in resilience theory by considering a longitudinal case. By doing so, the thesis expands the understanding of the role of social capital in resilience, from a concept relevant mainly for explaining self- organising capabilities of society after a disaster, to a concept that incorporates network participants' abilities to organise in partnership with the state to overcome the sources of vulnerability that affects them, being either environmental or institutional. This investigation also makes methodological contributions. The longitudinal approach to the role of social capital in urban resilience, using mixed-methods is an innovative one. By investigating longitudinally the structure of social networks and their operation, this thesis enhances the understanding of the social

dimension of urban resilience. This thesis makes a contribution to planning practice, by providing a case-study that shows the mechanisms that inhabitants of self-help settlements can use to forward their development, and overcome their sources of vulnerability. In conclusion, the longitudinal approach proposed in this research, helps to understand the resilience of poor urban communities, and informs public policies to meet the challenges of the 21st century.

1.5 Thesis structure

Chapter 2 discusses the key concepts that inform the research: social capital and urban resilience. The literature addressing both terms is reviewed and critically discussed. The chapter draws out, firstly, the theoretical implications of analysing social capital in the context of resilience, which primarily are its explanatory possibilities to understand urban resilience as a collective goal. Secondly, the concept of resilience is examined in the context of planning and sustainable development. Here, a definition of urban resilience rooted in ecological resilience is presented and its elements discussed, focusing on its social dimension. Following this, major gaps in knowledge are identified, based on the revision of the literature: to address the local scale (municipal) in the analysis of urban resilience; to understand how poor neighbourhoods, especially self-help settlements, can overcome vulnerability and achieve urban resilience; to explore how social capital can serve to process environmental stresses in self-help settlements, and convert them into opportunities to transform the built environment and improve its urban resilience; and finally, adapting the theoretical implications of resilience into a useful framework for planning theory. This chapter concludes by proposing a relevant theoretical framework for the investigation at hand, and defining the scope of analysis for the specific context of the research.

Chapter 3 sets out the methodology used in this study. First, the research approach is discussed. A discussion about using mixed methods while studying social capital in context is offered, detailing how quantitative methods are relevant to understand the structural elements of social capital (social networks), while qualitative methods unveil their operation. Second, a justification of the study of social capital in context is offered, and the case study approach with embedded units of analysis is introduced. Third, the strengths of using mixed methods are discussed, seeing them as complementary, as the weaknesses of one approach can be compensated by the strengths of the other, while the outcomes of both can be triangulated to add validity to the results of the research. Fourth, the disadvantages of mixed research are analysed, acknowledging that mixed methods can be time consuming, and require a great understanding of the strengths and weaknesses of qualitative and quantitative methods for the specific research at hand. Fifth, the research strategy is presented. This section details the three main activities undertaken for this research: desk-based research (selection of case-study), fieldwork (data collection,

and initial analysis), and coming back from fieldwork (data analysis, and writing-up). Sixth, the case study is introduced, followed by the sampling techniques that were used to unveil the social network related to the units of analysis, and the actors that participated in them. The chapter concludes with a description of the methods used to collect and analyse empirical data.

Chapter 4 presents Ciudad Nezahualcóyotl as a single case-study to examine the contribution of social capital to the urban resilience of self-help settlements. Ciudad Nezahualcóyotl (Neza) is a self-help settlement in the Metropolitan Area of Mexico City that experienced a process of rapid urbanisation boosted by rural-urban migrations, reaching 1.1 million inhabitants within 30 years of its foundation. The settlement is located on the bed of a drained-salty-lake which flooded in rain season, and was prone to sand storms in dry season, making its location unsuitable for urbanisation. Environmental threats were exacerbated by the lack of an accountable government, institutional certainty (absence of land tenure rights), and the absence of any urban infrastructures. Nevertheless, Neza is recognised as a successful case in which citizen participation has helped to overcome the sources of its vulnerability. The chapter argues that given its historical process, Neza is a good case to research the contribution of networks of social capital to the resilience of self-help settlements. Following this, the chapter discusses the embedded units of analysis used in this research: municipal independence, land tenure rights, water supply, drainage, public transport, and paved streets. The chapter argues that the selection of the embedded units of analysis considers their relevance in overcoming Neza's sources of vulnerability. Following this, a section discusses interview data, which unveils how local inhabitants understand the challenges they faced when they first arrived in the settlement. This corroborates the challenges identified as embedded units of analysis for the case-study from the perspective of early Neza residents, and helps to provide an explanation for the engagement of citizens into social networks.

Chapter 5 explores the formation of Neza's network of social capital using three different arguments. First, the chapter builds on findings of Chapter 4 regarding the challenges faced by early Neza residents, and provides an explanation to the formation of Neza's network of social capital, by discussing the transition from challenges to collective goals from the perspective of local residents. The chapter introduces two categories of collective goals: basic, and strategic. Basic collective goals aimed to build urban infrastructures (water supply, drainage, public transport, and paved streets) to tackle environmental challenges. Strategic collective goals (municipal independence, and land tenure rights) aimed to overcome institutional deficiencies that exacerbated environmental threats. The second argument used to explain the formation of Neza's network of social capital is the common background of early Neza residents (being poor rural-urban migrants). The third argument is the identification of some ethnic practices that facilitated the formation of Neza's network of social capital. Then, the chapter focuses on explaining the formation of the network through achieving two strategic collective goals: municipal

independence, and secure land tenure rights. Finally, a pattern is observed: the dual affiliation of network actors to the citizen-led social network, and a parallel political organisation. It is argued that this dual affiliation was used as a strategy to achieve the collective goals of network participants.

Chapter 6 focuses on the identification of Neza's social network. First, the chapter recognises that a single social network of 706 actors is responsible of forwarding six collective goals (municipal independence, land tenure rights, water supply, drainage, public transport, and paved streets) in the context of Neza's urban resilience. Then the chapter emphasises that participation in the social network did not occur in a sustained manner through time: actors had moments of intense participation (periods of rapid change), and moments of low participation (periods of slow change). These periods are measured in terms of number of participants, and the number of events (e.g. community petitions) recorder per year. Periods of rapid change, and periods of slow change correspond to milestones in the pursuit and achievement of collective goals of the social network. Following this, the chapter identifies that the social network remained active longitudinally, that is, even when the size of the network varied, a complete dissolution of ties was not observed. It is suggested that ties of social capital between network participants transition between states of active and latent engagement. For this, it is also suggested that the presence of a small number of actors, that remain active longitudinally, can activate network ties as required for the achievement of collective goals. The final part of the chapter tracks the importance of each collective goal, measured by the number of actors engaged in each goal through the observed period (1953-1986). It is observed that basic collective goals (water supply, drainage, public transport, and paved streets) gathered a larger number of participants than strategic ones (municipal independence, and land tenure rights). The chapter concludes by observing that a reduced number of network participants perceive the strategic collective goals as instrumental to the achievement of basic goals, but their participation is fundamental for the overall achievement of the collective goals of the social network.

Chapter 7 explains the structure and operation of Neza's network of social capital. The first part of the chapter analyses quantitative data using the methods of social network analysis. In this part, a detailed analysis of the social network is presented, identifying within the network the simultaneous operation of different substructures of bonding, bridging, and linking social capital. It is argued in this chapter that the simultaneous presence of different types of social capital facilitated the achievement of the collective goals of the network. Then, this data is analysed against the periods of slow and fast change (defined in the previous chapter). It is found that bonding substructures become larger at moments of rapid change, while at moments of slow change these substructures enter into stages of latency, suggesting that bonding structures are highly relevant in forwarding and achieving collective goals. It is also observed that the presence of actors performing functions of bridging, and linking social capital have a larger presence at moments of rapid

change. At moments of rapid change, actors in bridging and linking positions conform a subnetwork of their own. This subnetwork is not observed at moments of slow change. The second part of the chapter focuses on the operation of the social network, based on the thematic analysis of interview data. Qualitative data corroborates quantitative observations. First, the use of bonding social capital in the operation of the network was facilitated by extending family-type relations of trust and reciprocity between neighbours. Bonding relations were used reciprocally between participants in reconstruction efforts after the effects of weather extremes (flooding, or dust storms). Bonding social capital was escalated-up into bridging social capital when bonding groups started to cooperate with each other, in the pursuit of larger efforts such as the construction of protective infrastructures such as hand-made ditches. Bridging social capital was facilitated by the complementarity of joint actions of one group to the actions of the other. The formation of bridging groups facilitated the coordination between network participants for the pursuit of larger goals (e.g. construction of drainage and water supply infrastructures). This was key at moments of rapid change. Bridging networks were also useful to create social pressure in the development of vertical ties (linking social capital) with people in government positions, which in turn facilitated the achievement of the collective goals of the network.

Chapter 8 is the final chapter of this thesis. The chapter is divided in two parts. The first one discusses the findings of the thesis. In this first section, the findings are theoretically interpreted in order to provide answers to the research questions that guided this investigation. First, the research sub-questions are answered, and then the arguments serve to inform the answer of the overarching research question. The answer to the research questions point to the longitudinal engagement of social actors in networks of social capital, monitoring the challenges faced by self-help settlements and collectively providing solutions to those challenges, thus effectively adjusting self-help settlement to changing circumstances. The result of this is the increased wellbeing of inhabitants. The second part of the chapter provides the concluding remarks of the thesis. Concluding remarks cover the challenges and opportunities in the use of the concepts of social capital and urban resilience in this thesis, a reflection on the research methods used and the implications of this thesis for planning practice. Finally, the thesis ends with proposing areas for future research building on the findings of this research.

2. Resilience and social capital

This chapter discusses the key concepts that inform this thesis and identifies the main gaps in the literature that provide the basis for the formulation of the research topic. It starts by examining critically the concept of resilience in the context of planning, moving from early perspectives of disaster and emergency management, towards a wider conceptualisation within the agenda of sustainable development. Then, the theoretical and conceptual aspects of social capital, and their implications in understanding the role civic engagement in forwarding urban transformation are presented. Following this, an appropriate theoretical framework for this research is introduced. The proposed theoretical framework, on the one hand, incorporates the idea of urban resilience as a process in which cities address environmental threats by managing change. On the other hand, it suggests that urban responses to environmental threats can be explained relying on the concept of social capital.

2.1 Resilience in urban planning

This section discusses the meaning of the concept of resilience in urban planning. Resilience is tracked from its conceptual origin in biology, to its use as a desirable normative goal in urban planning. Following this, an operational definition of the concept for urban areas is introduced, and its key dimensions illustrated (social, spatial, and economic). This is done paying special attention to the social dimension of resilience.

Resilience's conceptual origin and its contemporary scientific use

Resilience is a concept that, in its modern scientific use,3 was coined by Holling (1973) and has its origins in the 1960s and early 1970s. The concept was developed from a branch of biology trying to explain system dynamics, and in particular ecosystem dynamics between interacting populations, in a context where human actions were an essential component of ecosystems' capacities to create ecosystem services. Its proponents developed the term to defy the idea of single stable ecosystems, and introduced the notion of multiple stable possibilities of a system, depending on the myriad of trajectories that interacting populations might develop in a particular ecosystem.(Folke, 2006; Young et al., 2006). Resilience studies evolved from an early focus in multi-stable states of ecosystems to study the cycles of adaptive change *"in which persistence and novelty are intertwined, and finally to transformations that can cascade up scales when small, fast events trigger big, slow ones"* (Young et al., 2006, p. 304).

In his seminal paper 'Resilience and Stability of Ecological Systems', Holling (1973, p. 17) stated that *"[r]esilience determines the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state var-*

3 According to Béné et al. (2017), the use the concept of resilience in science can be traced back to the nineteenth century in the context of warship design.

iables, driving variables, and parameters, and still persist. In this definition resilience is the property of the system and persistence or probability of extinction is the result." Interestingly, in the same paper, he contrasts the concepts of resilience and stability, defining stability as *"the ability of a system to return to an equilibrium state after a temporary disturbance. The more rapidly it returns, and with the least fluctuation, the more stable it is."* (Holling, 1973, p. 17)

Despite the fact that Holling explicitly referred to resilience and stability as contrasting terms, both definitions were adopted as independent understandings of resilience (Thorén, 2014). In the literature it is possible to identify three fundamental ways of defining resilience, from which several ramifications have emerged as the term is adopted and cross-fertilised from the various disciplines that have integrated the concept. These perspectives are: engineering resilience, ecological resilience, and social-ecological resilience.

Engineering resilience evolves from Holling's definition of stability, and is defined as the ability of a system to return to an equilibrium or steady-state after a disturbance (Holling quoted in Davoudi, 2012). From this perspective, resilience is found in systems that have the ability to bounce back to their original state, or at least to a functioning, stable shape in a short period of time after the occurrence of a shock or disturbance (Ahern, 2011; Davoudi, 2012; Fünfgeld & McEvoy, 2012; Gallopín, 2006). *"Engineering resilience therefore focuses on maintaining efficiency of function, constancy of the system, and a predictable world near a single steady state."* (Folke, 2006, p. 256)

On the other hand, ecological resilience is defined as *"the capacity of a system to absorb and utilize or even benefit from perturbations and changes that attain it, and so to persist without a qualitative change in the system's structure"* (Young et al., 2006, p. 306). Here, disturbance may provide opportunities for renewal, reorganisation, and the emergence of new trajectories (Adger, 2006; Folke, 2006). From this perspective, the emphasis is placed on understanding the world as complex, unpredictable, chaotic, and uncertain (Bahadur & Tanner, 2014; Davoudi, 2012). It asks *"how periods of gradual change interplay with periods of rapid change and how such dynamics interact across temporal and spatial scales"* (Folke, 2006, p. 254). Resilience here, instead of focusing on the attempt to control change, is found in the adaptive capacities of a system that allow continuous progress to manage change (Davoudi, 2012; Folke, 2006).

When applied to systems where human presence is crucial to the dynamics of the system (coupled social-ecological systems4), the resilience metaphor must be applied critically. In systems where human presence is not relevant, ecological resilience is deterministically provided by biophysical processes (O'Brien, Hayward, & Berkes, 2009).

4 Other names for this type of systems in literature are: socio-ecological systems, social-ecological systems, and coupled human-environment systems.

On the other hand, social-ecological systems integrate human agency, knowledge, rules and institutions, mediating and interpreting nature, as integral parts of the system (Adger, 2006).

The above considerations open room for a distinctive branch of resilience: social-ecological resilience. Social-ecological resilience not only incorporates human agency and institutions as one of the interacting components of the system, but it introduces relevant dimensions such as ethics, politics, and governance –among others- to the resilience concept. This begs the answer to questions such as: what is it to be resilient? What parts of the system are worth making resilient? Who pays for and who benefits from increased resilience? And finally, is resilience normatively desirable?

While emerging from ecological resilience, social-ecological resilience focuses on the human dimension, and is concerned with the normative goal of generating resilience through the governance of linked social-ecological systems to respond to complex non-linear dynamics (Wilkinson, 2012). Social-ecological resilience goes beyond the system's ability to withstand or rebound from disturbance. Instead, it introduces a normative interest of leaping forward (Dodman, Ayers, & Huq, 2009; Porter & Davoudi, 2012; Shaw, 2012; Wilkinson, 2012; Young et al., 2006). It also incorporates ideas of creating and taking advantage of possible opportunities that disturbance might bring for self-organisation, innovation, renewal, reorganisation and development (Folke, 2006; O'Brien et al., 2009; Wilkinson, 2012), which goes beyond action within the social domain, and requires the development of institutional capabilities to allow responding to system dynamics in an informed manner (Folke, 2006). Thus, resilience is seen as a process that enables to cope with internal or external shocks (Dodman et al., 2009), and that contributes to the improvement of the quality of life of the members of an environment or range of environments, from individual to mankind scales (Gallopín, 2006).

Resilience in planning

One of the multiple disciplines that have incorporated resilience in their discourse is urban planning. This has been done in relation to disaster risk management (DDR), climate change adaptation (CCA), and sustainable development (SD) issues. Similar to the use of the concept in other disciplines where resilience has been understood in its two fundamental ways (engineering and ecological), DDR and early CCA have incorporated the term from the engineering perspective. DDR and CCA incorporating engineering understandings have stressed *"the capacity of cities, infrastructure systems, and urban populations and communities to quickly and effectively recover from both natural and human-made hazards"* (Leichenko, 2011, p. 165). And more recently in CCA and SD perspectives, the discussion has incorporated social-ecological definitions emphasising the *"examination of cities and urban networks as complex adaptive systems"* (Leichenko, 2011, p. 164). The difference between these two visions is that one seeks to avoid system

failure, while the other normatively looks for the enhancement of the wellbeing of society (Adger et al., 2009). The following sections discuss the particularities of the use of each resilience approach in urban planning.

Disaster Risk Management (DDR) and early Climate Change Adaptation (CCA) perspectives

The discourse of engineering resilience has been adopted by built environment scholars and practitioners, fundamentally from the DDR and early CCA perspectives, where what matters is the quick return to a functioning stable state after a disturbance (DDR), and the ability to foresee and prevent systemic failure derived from potential disturbance (CCA). Thus, its main concern is maintaining the status quo through the reduction of risk, adaptation to potential hazards, and recovery from the impact of internal and external shocks (Adger, 2006; Adger et al., 2009; Davoudi, 2012; Fünfgeld & McEvoy, 2012). Thus, the main normative concern of engineering perspectives is to avoid systems failure by maintaining the status quo.

Engineering resilience consider three main dimensions in its framework: spatial, social, and economic. The spatial dimension is concerned with building and developing infrastructures and adaptations that are robust and redundant. This means that they can withstand foreseeable shocks, while multiple infrastructures and systems should be in place to serve the same or similar functions (i.e. multiple energy sources might reduce the likeliness of system failure in case one energy source is compromised) (Ahern, 2011; Tyler & Moench, 2012). The social dimension of engineering resilience is concerned with the existence of appropriate social and institutional capacities that enable the effective action of agents during and after a shock (Tyler & Moench, 2012). Social dimension usually considers top-down managerial responses that are oriented to deal with threats to security (Shaw, 2012). In general terms, social and institutional capacities that are required in the social dimension of resilience seen from the DDR and CCA stand points require a precise understanding of the potential shocks that a system might encounter, in order to build robust structures to withstand potential shocks, and develop effective social and institutional response mechanisms. Thus, it supposes that abilities to accurately forecast potential shocks are necessary to identify avenues for prevention and adaptation; also, it supposes that foreseeable shocks will follow predictable patterns from past experiences (Davoudi, 2012; Tyler & Moench, 2012). The economic dimension, similarly to the spatial one, tends to stress the importance of diversified economic activities, which may allow the operation of the system and facilitate recovery after an external or internal disturbance (Ahern, 2011; Bahadur & Tanner, 2014).

Both DDR and CCA try to respond to environmental challenges by reducing the impacts that extreme events have in urban areas (Solecki, Leichenko, & O'Brien, 2011). The ways in which environmental impacts are reduced is through structural and

non-structural adaptations, focusing on: risk assessment, institutional capacity building, risk mitigation investments, catastrophe risk financing, and emergency preparedness and early awareness (Solecki et al., 2011; Tyler & Moench, 2012). The role of planning is thus to identify the potential drivers of change, and plan for interventions to impede regime shifts (Wilkinson, 2012).

The concept of resilience focusing on DDR and CCA has been adopted by several governmental and non-governmental organisations (i.e. UK's Sector Resilience Plans (Cabinet Office, 2014) the Mexican strategy for adaptation to climate change (INECC-Semarnat, 2012), and the Mexican General Law on Climate Change (DOF, 2012)). These organisations largely follow the definition provided by the United Nations, resilience being *"[t]he ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions"* (UNISDR, 2009). However as discussed by Solecki et al. (2011), differences between CCA and DDR approaches to resilience appear to be in their governance and forms of action. CCA resilience interpretation usually guide actions of environmental ministries, and respond to international organisations; while DDR interpretation is used by disaster response and recovery services that deal with the interaction between vulnerabilities and extreme events resulting in disasters (landslides, flooding, droughts) (Solecki et al., 2011).

Engineering perspectives of resilience, widely used in the planning arena, might be effective in emergency response situations, but limited to foster change on the long run. This is because engineering resilience is focused on coping with shocks to maintain a given stable state, and thus, failing to address the complex variety of interwoven factors that are relevant in resilience from a human perspective. As put by Shaw (2012), this interpretation of resilience is based on managerial or technical solutions that are top-down and designed to preserve 'business as usual' against perceived risks, without questioning the causal processes that put people at risk. Planning for stability might be also dangerous, since it can foster the rigidity of the system, which *"reduces flexibility, willingness, and ability to enter into new rounds of adaptation, and increases risk of catastrophic collapse"* (Pelling & Manuel-Navarrete, 2011, p. 4).

A dramatic example of the latter is the negative impact that, in 2005, hurricane Katrina had in the city of New Orleans. In this case, a cascade of interacting failures in the social, spatial, and economic dimensions made evident the need to question the pertinence of the status quo (Davoudi, 2012). In this case, the prevailing arrangement of governance induced catastrophic failure by limiting the action of institutional and social agents (i.e. budget cuts in disaster management institutions), limiting the efficiency of infrastructures (i.e. reduced maintenance of seawalls), and maintaining an exclusionary social system (Sobel and Leeson, 2006 cited by Adger et al., 2009).

Resilience in Sustainable Development (SD) and recent Climate Change Adaptation (CCA)

Perhaps the most appealing perspective of resilience in planning is that influenced by social-ecological resilience, which opens room for more comprehensive understandings, including a more evident connection with sustainable development as defined in the widely known Bruntland Report. Sustainable development is one that *"meets the needs of the present without compromising the ability of future generations to meet their own needs"* (Brundtland & Development, 1987, p. 8). At its widest, this definition provides a strong ethical perspective of development, not only by incorporating the idea of trans-generational responsibility, but by recognising the importance of a better distribution of wealth, and to extend the opportunity for a better life for all. This ethical responsibility incorporates the idea of meeting social goals within the biosphere's carrying capacity. *"[S]ustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs."* (Brundtland & Development, 1987, p. 9)

It is possible to observe several overlapping points between sustainable development and social-ecological resilience, since both are concerned with change and the normative goal of reaching better living conditions for all, with a cross scale emphasis (from local to global, and from present to future) and its relation with human-nature interactions (Wilkinson, 2012). *"Resilience thinking reminds us that environmental problems cannot be addressed in isolation of the social context."* (O'Brien et al., 2009, p. 5 [italics in original])

Social-ecological resilience understands the future as complex and unpredictable, where transformation and dynamic systems are normal (Porter & Davoudi, 2012). This challenges the fundamentals of traditional planning tools and methods, which rely on forecasting to reduce uncertainties; and calls for a shift in the objective of planning towards enabling innovative transformations to manage change rather than react to it (Davoudi, 2012; Folke, 2006; Shaw, 2012). In social-ecological resilience the central objectives are: building capacity for learning and the development of adaptive capacities for change and surprise (Adger, Hughes, Folke, Carpenter, & Rockström, 2005) able to influence multiple scales (O'Brien et al., 2009) and time frames (Davoudi, 2012; Tyler & Moench, 2012). According to O'Brien et al. (2009, p. 6), *"[a] resilient social–ecological system fosters fairness, inclusivity and diversity, pluralism of knowledge, and social learning."*

Despite the common grounds and overlaps between conceptualisations of resilience in recent CCA and resilience in SD, differences become evident in the literature in the treatment of time frames. While resilience in CCA is about building short term coping capacities, resilience in SD is more concerned in planning for long term capacities for

change (Boyd, 2014). However, *"managing for resilience still 'suffers' from the way that trade-offs are conceptualised between the ability to recover from short-term shocks such as coping with seasonal food deficits and sustainability, which is the long-term planning for adaptation capacity under a changing climate"* (Boyd, 2014, p. 344).

The incorporation of social-ecological understandings of resilience into CCA and SD planning practice still requires to develop planning tools to address its principles. As explained by Wilkinson (2012, p. 160), social-ecological resilience, *"is yet to develop a strong theoretical base for addressing matters of power, conflict, contradiction and culture"* in order to translate it into planning theory, as well as solving the conceptual trade-offs for building coping capacities for multiple time frames (Boyd, 2014). Also, the transition of social-ecological resilience to urban planning requires the development of less hierarchical planning approaches accounting for the meaningful participation of stakeholders (Ahern, 2011); and considering the social, economic and physical dimensions necessary for humans to survive and thrive (Dodman et al., 2009). Planning for resilience has to incorporate the understanding of adaptive management as an on-going process, for which learning and governing for transition towards more sustainable paths is essential (Folke, 2006; Tyler & Moench, 2012). This implies considering making space for experimentation in planning, which in turn could nurture the conditions for recovery and renewal after a disturbance (Wilkinson, 2012).

As stated earlier, resilience -understood as the ability of ecosystem to manage change, and to be prepared for uncertainty and surprise to survive and strive-, seems to be a positive and desirable condition; however, we must be critical with the concept when applied to ecosystems with the presence of humans. As explained by Pickett et al. (2004), transferring the concept of resilience from its purely biological understanding to its use in ecosystems with a human presence (i.e. urban areas), entails not only understanding the meaning of resilience, but the societal processes involved. This calls for understanding the presence of humans as part of the ecosystem by integrating *"human perception, learning, and resultant actions are part of the human ecosystem"* (Pickett et al., 2004, p. 378 [italics in original]). In other words, it is necessary to understand how social groups interpret and learn from managing change in a positive and desirable way, and furthermore it is necessary to question how resilience can be normatively achieved. In this respect, to make a normative use of the resilience concept entails questioning the processes which determine what parts of the systems are to be resilient, which are to be changed, who is going to benefit from added resilience and, who is going to be excluded (or suffer) from this process and why (Wilkinson, 2012). In ecosystems with human presence there might be processes worth preserving and others that need to be changed, however it might be difficult to transform a resilient system from its current state into a more desirable one (Folke, 2006). And furthermore, with regards to climate change, this implies improving wellbeing in a way that does not worsen the causes and consequences of climate change (Dodman et al., 2009).

Another aspect that calls for caution in using the concept of resilience in planning, is the likely understanding of bottom-up and self-organising features of resilience as a favourable environment for conservative agendas calling for the retreat of the state from participating in the achievement of resilience (Shaw, 2012). For instance, the 'Resilient Nation report', argues that *"resilience is built not by government and the institutions of the state, but by individuals and communities"* (Edwards, 2009 cited by Davoudi, 2012, p. 305). This kind of arguments can be used to *"demonise those people or places who are deemed to be "just not resilient enough"*, and support a withdrawal of state services under the conditions of *"advanced marginality"*" (Porter & Davoudi, 2012, p. 332), which can ultimately be considered as undermining resilience as understood from social-ecological understandings.

Once that the limitations and the negative implications in the use of the concept have been raised, it is still considered to have the potential to shed some light in the understanding of the dynamics that contribute to increase the resilience of urban communities. However, it is important to bear in mind the potential political, ideological and instrumental implications that the misuse of the concept might carry.

Urban resilience, a social-ecological perspective

The use of social-ecological resilience in urban planning requires to make explicit how the key concepts of social-ecological resilience apply in cities. Leichenko (2011) addressed this issue by coining the term of Urban Ecological Resilience (UER). While rooted in social-ecological resilience, UER also emphasises uncertainties, nonlinearities, and self-organising abilities of ecological and coupled human-environment systems (Leichenko, 2011). UER is seen to be part of a wider strategy seeking for urban sustainability and development (Leichenko, 2011). Other authors contributing to the understanding of urban resilience form a social-ecological perspective consider urban resilience as the processes allowing the continued adjustment of cities in an evolutionary fashion through their history (Adger, 2000; Pickett et al., 2004) in face of environmental uncertainties, nonlinearities (Leichenko, 2011), and the unforeseen (Satterthwaite & Dodman, 2013). Urban resilience operates at multiple scales ('in cities' and 'of cities'), timeframes (past, present, and future); and it depends on a number of abilities (e.g. flexibility, adaptability, and transformability) interacting in multiple dimensions (social, and spatial). In this section, the scales, abilities, and dimensions of urban resilience are explained.

Regarding the treatment of scales of analysis of resilience in urban contexts, Ernstson et al. (2010) identify two fundamental scales: 'resilience in cities', and 'resilience of cities'. Resilience in cities operates within the city, and is concerned with land use patterns, the urban form, and urban ecosystem services (e.g. parks, and urban forests) (Ernstson, 2013). Resilience of cities operates at the scale of systems of cities and is concerned with their sustaining environment and its networks, from where they obtain

food security, waste management, water and energy supplies. In terms of time scales, in the present time urban resilience is influenced (either positively or negatively) by past adaptations (Young et al., 2006), while influencing future ones. Insights from the past may serve to develop present and future adaptations, by learning from previous success and mistakes (Adger et al., 2009; Tyler & Moench, 2012). And as put by Satterthwaite (2013a), if present and future stressors are similar to the ones experienced in the past, then urban areas that have coped with them might already have accumulated considerable resilience to them. And finally, the treatment of future timeframes in urban resilience should consider that current actions not compromise future resilience (O'Brien et al., 2009), following the principles of sustainable development (Brundtland & Development, 1987).

The abilities that urban systems, as social-ecological systems require for their resilience are flexibility, adaptability, and transformability. Flexibility has been defined as the ability of systems to perform essential tasks under multiple conditions, and to introduce new ways of performing those essential tasks if current methods fail (Tyler & Moench, 2012), that is, is the ability of introducing change. In other words, flexibility is the collective ability to change (Wilkinson, 2012) that permits the continued adjustment of cities at multiple scales and time frames (Adger, 2000; Pickett et al., 2004). For example, the emergence of urban agriculture as a source of food supply in places where food security is being threatened by external forces is an example in which food supply systems are flexible. Adaptability is the dynamic process of structural change, rather than a particular state in history, that permit the co-evolution of a system with external factors (i.e. climate change) (Pelling, 2011; Young et al., 2006). According to Pickett et al. (2004), since cities and urban regions transform through their history, an appropriate vision of resilience is the ability of cities to adjust in the face changing conditions in a dynamic and evolutionary fashion. Gallopín (2006) considers that adaptability is the collective capacity of human systems to improve, or at least maintain, the quality of life of its members, from the individual to mankind. According to Folke (2006) adaptability goes beyond the capacity to respond within the social realm, and it also means the ability to respond to and influence in an informed manner, changes in ecosystem dynamics. Finally, transformability is the capacity of people to create a new social-ecological system when the compound events from the conjuncture of multiple factors (economic, political, and ecological) make a system untenable (Folke, 2006; Pelling, 2011). The objective of transformability efforts is a radical change that will improve the governance of the social-ecological system (Pelling, 2011). Adaptability and transformability seem to operate in a progressive and incremental fashion determined by surpassing each ability's threshold; while flexibility enables the transition between adaptability, and transformability. That is, when the limits of a system to introduce adaptations to improve or at least maintain the quality of life of urban systems are reached (i.e. when the combination of social and ecological make a system untenable), radical system transformations towards an entirely new social-ecological system are required.

The social dimension of urban resilience in its social-ecological understanding involves engaged social networks, accountable governance, institutions, and leadership as well as processes of social learning where social capital, collective action, relations of power, and politics play a substantial role (Adger et al., 2009; Bahadur & Tanner, 2014; Davoudi, 2012; M. D. Turner, 2013). The social dimension of urban resilience is an important component under which social groups adapt to environmental change. It operates at the community level, rather than in individuals, hence is related to the social capital of societies and communities, as a mean for the existence of interacting features such as norms of trust and their capacity to build social networks to enable a community's agency and collective action (Adger, 2000). In this regard, Aldrich (2012) stresses the importance of high levels of social capital in resilience over the importance of economic resources, external aid, and low levels of damage; and explains that resilient communities are those capable to cope with crises through co-operative activities embedded in social networks. However, as discussed by Tyler and Moench (2012), resilience is not a characteristic that can be understood as being uniformly distributed across the urban population; rather, it depends on the differentiated capacities and characteristics of groups, where location, poverty, quality of the shelter, access to services and social networks, are key features.

Government institutions in resilient cities firstly participate directly, through the provision and maintenance of infrastructure (Dodman et al., 2009). Secondly, they have the role of supporting governance arrangements to navigate change and build capacity to withstand shocks by facilitating the generation of new knowledge (Tyler & Moench, 2012),*"while nurturing discourses that situate the city as part of regional ecosystems"* (Ernstson et al., 2010, p. 531). And finally, government institutions contribute to the resilience of cities by enhancing the active, democratic and meaningful participation of society in decision making, as well as creating effective pro-poor institutional arrangements (Dodman et al., 2009).

The spatial dimension of urban resilience refers to the combination of physical assets able to produce a positive interaction between the built environment and the ecosystem the city is part of, while enabling urban populations to improve their quality of life in face of changing circumstances. For this, resilience requires that all urban population have: equitable access to services and infrastructures (Dodman et al., 2009; Tyler & Moench, 2012), good quality of shelter (Satterthwaite, 2013a; Tyler & Moench, 2012), a safe location (Dodman et al., 2009; Satterthwaite, 2013a), and secure land tenure (Haider, Quinlan, & Peterson, 2012). Finally, the economic dimension of urban resilience can be simply put as the need for an equitable distribution of resources (Dodman et al., 2009; Porter & Davoudi, 2012), and addressing critically the outcomes of building resilience, which might be unequally distributed across social groups (Bahadur & Tanner, 2014). An extreme example of this could be the one provided by Ernstson et al. (2010) while describing the uneven historical relations of power in Cape Town, South Africa driven by ethnic differences. These uneven power relations led Cape Town to have a historic racist

and class-oriented distribution of the benefits and externalities of urban development, which benefited rich sectors of the population while leaving the poor with the worst part of the city, and the overall deterioration of environmental services. Another example is the construction of flood protecting infrastructures by affluent sectors of the society in Gorakhpur, India, which had a negative effect in adjacent areas occupied by households that could not afford this protective infrastructures (Bahadur & Tanner, 2014). Thus, a normative economic principle in urban resilience should be the equitable distribution of burdens and benefits related to urban resilience (Davoudi, 2012).

In sum, the use of social-ecological understandings of resilience in cities can be understood as the processes allowing the continued adjustment of cities in an evolutionary fashion through their history (Adger, 2000; Pickett et al., 2004) in the face of environmental uncertainties and nonlinearities (Leichenko, 2011). For this, cities depend on a number of abilities (e.g. flexibility, adaptability, and transformability) and dimensions (social, economic, and spatial), which operate in multiple time frames (past, present, and future), and scales ('in cities' and 'of cities'). This is the definition of resilience that is used in this thesis.

Despite the research focusing mainly on the social aspects of urban resilience, the definition of urban resilience used in this thesis takes a socio-ecological perspective. The context of the research is indeed socio-ecological, given that the interaction of both dimensions posed the environmental and institutional challenges that the inhabitants of Neza had to address (See Adger, 2000 for a similar understanding). This approach enabled the understanding of the problematic at hand more comprehensively than just focusing on one dimension or the other. Nevertheless, the aim of this research is to explain the responses to those challenges that emerged from the social realm through the theoretical lens of social capital (See Goulden, Adger, Allison, & Conway, 2013 for a similar approach). This approach is taken recognising that resilience is as an interdisciplinary field *"that focus on nature-society relationships for understanding and tackling diverse environmental problems"* (Kull & Rangan 2016, p. 71), and that related research should allow for a dialogue of multiple disciplines (Wilkinson, 2012). In this thesis, it is proposed that such interdisciplinary approach is indeed necessary to provide a comprehensive understanding of the case at hand under a social-ecological perspective, but given the bounds of a doctoral project, the study of the ecological dimensions of the case are identified as an avenue for future research in collaboration with scholars from physical and environmental disciplines.

2.2 Social capital in urban transformation

The objective of this section is to discuss the explanatory possibilities of the theory of social capital to understand processes of urban transformation. Here, the most influential authors and their understandings of the term are explored; then, building on

these seminal perspectives, different types of social capital are discussed, while the main criticisms of the term are acknowledged. Afterwards, social capital is explored in the context of change, to explain the collective action oriented to the transformation of the built environment.

Bourdieu, Coleman and Putnam

Social capital is perhaps one of the most influential concepts in recent social science theory (Durlauf, 2002), since its popularisation after the publication of Robert Putnam's book 'Bowling alone: The collapse and revival of American community' in 2000, which discusses the importance of associational behaviour for the democratic community life in America (Putnam, 2000b). However, the term started to gain traction in the 1980s with the work of Pierre Bourdieu (2008 [1986])5, James James S. Coleman (1988), Francis Fukuyama (1995) and Robert Putnam (1995a, 1995b).

As defined by Bourdieu (2008 [1986], p. 286), social capital is the *"aggregate of the actual potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition –or in other words, to membership in a group– which provides each of its members with the backing of the collectively-owned capital, a credential which entitles them to credit, in the various senses of the word"*. It is important to stress that in this definition benefits of social capital are yielded by individuals. Bourdieu's intention was to explain the production and division of classes (DeFilippis, 2001), since classes are reproduced by the construction of meanings and connections shared in a particular social group, culturally, ideologically and contextually (Harriss, 2002). This perspective can be framed within the Marxist class theory in which workers, *"[by] being thrown together in a common situation, […] learn to identify with each other and support each other's initiatives. This solidarity is not the result of norm introjection during childhood, but is an emergent product of common fate"* (Portes, 1998, p. 8).

For Bourdieu, social capital is understood economically, and is part of other forms of capital: economic and cultural, all of which can be transformed and exchanged into one another. According to him, the production and reproduction of any form of capital is about power, and power and capital are almost synonyms, as explained by DeFilippis (2001). *"The field of power is a field of forces defined by the structure of the existing balance of forces between forms of power [economic, cultural and social], or between different species of capital. It is also a field of struggles for power among the holders of different forms of power"* (Bourdieu & Wacquant 1996, cited by Siisiainen, 2003, p. 32 [italics in original removed]). Bourdieu addressed social capital focusing on the benefits

5 Originally published as: Bourdieu, P. (1986). The Forms of Capital. In J. G. Richardson (Ed.), *Handbook of Theory and Research for the Sociology of Education*. Westport, Connecticut: Greenwood Publishing Group.

that an individual obtains from their *"participation in groups and on the deliberate construction of sociability of creating"* social capital (Portes, 1998, p. 3), in other words as *"actors engaged in struggle in pursuit of their interests"* (Siisiainen, 2003, p. 10).

Other authors have defined social capital differently, such as James S. Coleman (1988, p. 98) *"Social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors –whether persons or corporate actors– within the structure. Like other forms of capital, social capital is productive, making possible the achievement of certain ends that in its absence would not be possible."* For Coleman, social capital is whatever facilitates individual or collective actions, which as noted by DeFilippis (2001, p. 784), is *"not a mechanism, a thing, or an outcome, but simultaneously any or all of them"*. It is nested in closed social structures (Portes, 1998), not within individuals, and is context and history dependant, meaning that what constitutes social capital in a given setting does not necessarily does elsewhere or in a different temporal moment (Edwards & Foley, 1997; Portes & Landolt, 2000). Similar to Bourdieu, Coleman sees social capital from an economic perspective, and argues that social relations *"become capital, a store of value [...] when participants can rely upon another to uphold social norms and to reciprocate help. This reliance permits the participants to make instrumental use of relationships of solidarity and to conserve the resource that spontaneously emerges from them –mutual trust"* (Putnam et al., 2004, p. 147).

Fukuyama, on the other hand, while influenced by Coleman, like Bourdieu, also locates social capital as an individual property, not a public one, while its benefits are expressed in groups and even larger social aggregates (Fukuyama, 2001). Fukuyama emphasises that trust is a key aspect that facilitates voluntary associations, and defines social capital as *"the component of human capital that allows members of a given society to trust one another and cooperate in the formation of new groups and associations"* (Fukuyama, 1995, p. 90). For him social capital is the moral fabric that underlies a community, through an informal set of ethical rules or norms that are the foundation of social trust (Fukuyama, 1995). For Fukuyama, large stocks of social capital lead to more economic growth. This is reflected in the ability of some countries to grow economically and develop, while others do not, since *"not all cultures are equally equipped to foster economic growth [...] not all societies have equal stocks of social capital"* (Fukuyama, 2002, p. 27).

Perhaps the most influential understanding of social capital is the one offered by Putnam (1995b). Putnam took and expanded Coleman's perspective, and defined social capital as the *"[f]eatures of social life –networks, norms, and trust – that enable participants to act together more effectively to pursue shared objectives."* (Putnam, 1995b, pp. 664-665). Perhaps the main difference between Putnam's, and Coleman's and Bourdieu's understandings, is that he moved *"away from an emphasis on how individuals make pur-*

poseful, self-interested choices to understanding how social norms and social structures emerge and condition individual behaviours" (Durlauf, 2002, p. 259). Another key difference is that Putnam (2000b) introduced the idea of seeing civic participation in the achievement of collective goals, as of community's social capital, which is taken as a normative end for public policy. Other authors such as (DeFilippis, 2001); Portes (1998) consider that another key difference is the unit of analysis, by moving social capital from the individual and small groups, to the scale of cities, and even nations.

Putnam's work largely locates social capital in citizens' membership and participation in voluntary (DeFilippis, 2001; Welzel, Inglehart, & Deutsch, 2005), non-confrontational –apolitical– associations, such as Non-Governmental Organisations (NGOs), Parent-Teacher Associations (PTAs), church groups, and bowling leagues (Putnam, 2000b). According to him, these organisations serve civic interests by creating habits of cooperation and public pride, facilitating the achievement of collective ends (Newton, 1997; Szreter, 2002), such as good governance.

The main differences in the understandings of the term, according to the definitions offered by its main proponents are: the units of analysis (individuals, small groups or larger social aggregates such as cities or nations) and the yielding beneficiaries (out-group or in group). Bourdieu and Coleman took individuals and small groups as units of analysis, they considered that social capital is located in communities and realised by individuals participating in the group in the form of formal or informal benefits, while Fukuyama sees social capital located in individuals, not in societies, but he sees the benefits at national scales (out-group). Putnam, lastly, locates social capital and its benefits both in individuals and in larger aggregates (neighbourhoods, cities and nations).

Despite the different perspectives of social capital between its main proponents, it is useful to see them as complementary to each other rather than contested understandings. While moving from Coleman's moral and individual utility of social structures, to Putnam's civic desirability and utility in the public policy agenda, might be important to study wide social contexts such as cities, Bourdieu's power perspective is useful to untangle how social structures achieve collective civic ends.

Types of social capital

Building on these debates, a number of types of social capital have been described in the literature as explanations of how different social arrangements achieve their ends, by describing both the way in which these arrangements work and their general purpose. Despite the fact that the literature is rife with a growing number of types of social capital, the purpose here is not to cover all of them, but to acknowledge the most influential ones, which have been seminal for the theoretical development of all the rest. The five fundamental forms of social capital are: bonding, bridging, linking, bracing, and identifying.

Bonding social capital emerges from the interaction, trust and reciprocity of rather homogeneous social groups, and *"refers to social cohesion within the group structure"* (Grant, 2001, p. 977). This, according to Putnam (2004) is important for 'getting by'. In other words bonding social capital is useful to cope with the challenges of everyday life, such as flat tyres, child care, and small money loans (De Souza Briggs, 1997). Bonding social capital depends on the cohesion at the interior of the group's structure (Grant, 2001), in which the repeated interaction between its members strengthens the links formed at the interior of a social network (Durlauf, 2002). Bonding groups of social capital often operate at micro scales, where a group is territorially based (Rydin & Holman, 2004), and is associated with the existence of strong intra-community ties (Woolcock & Narayan, 2000).

Seen from Bourdieu's economic perspective, access to bonding social capital, as any other form of capital, depends on the position in society one is in. Given the unequal economic structure of society, it is possible to observe that *"the very poor are relatively rich in social capital not necessarily because they have absolutely more of it than the better-off in society, but because it is the only form of capital to which they have relatively abundant access"* (Szreter, 2002, p. 577). Similarly, Light (2004) notes that accessing bonding social capital is rather democratic, in comparison with other forms of capital, and this is why disadvantaged communities tend to rely on this type of capital to improve the conditions in which they live.

Bonding social capital is important for the very poor in society as a way of 'getting by' in life through a series of formal or informal benefits resulting from bonding. Benefits from being part of bonding groups can be: a neighbour looking after a single mom's child while she is working; relying on the embedded rules of trust and reciprocity present in that particular context that secure the neighbour access to a similar service from the single mom in return. Putnam (2000b) argues that participating in bonding social networks is not likely to lead to breaking poverty circles, since it only provides connections with people within the same networks, and as such with the same range of resources.

Bridging social capital is created by bringing together groups and networks of the 'bonding' type of social capital (Durlauf, 2002) and 'horizontally' links people who are unlike one another, through weak extra-community networks (Woolcock & Narayan, 2000). This type of social capital is important for 'getting ahead' (Putnam, 2004), as it creates social leverage, for example when locally-focused groups get in touch with other locally-based groups elsewhere with similar problems, ideologies and political regimes, to build wider networks and forward their shared agenda (De Souza Briggs, 1997). Putnam gave the examples of grassroots social movements (e.g. women suffrage movement, and the civil rights movement).

According to Putnam (2000b), bonding social capital is what amalgamates society, while bridging social capital is what makes the society *"play the political game more productively and more equitably"* (De Souza Briggs, 2004, p. 155). This type of social capital is often interpreted as creating 'horizontal' connections between organisations that share similar characteristics, and thus having a similar level of power. With bridging social capital, the role of place and territory is less significant as the scales of operation can be either macro or micro; additionally, the emphasis is placed on the networks rather than on the existence of common rules and values (Rydin & Holman, 2004).

Linking social capital is a later addition to Putnam's understanding, that explains the connections between different groups of wealth and power, thus 'vertical' connections. Linking social capital is often attributed to the work of Woolcock (Szreter, 2002), and refers to extra community linkages (Woolcock, 1998) between local people and people in position of authority. These links play a special role in development and poverty alleviation (Putnam, 2004; Woolcock, 1998). Unlike with bonding social capital, participants in linking social capital do not necessarily have to share a common background or common origin, and the reason for engaging with each other is to achieve valued common goals beyond the possibilities of their networks of bonding social capital (Szreter, 2002), in other words, as a collective good (De Souza Briggs, 1997).

As noted by Harriss (2002) and Lehtonen (2004), the conceptualisation of linking social capital emerges from the need to recognise the role of power in the interaction between different social networks, and furthermore to provide a tool not just to recognise power inequalities, but also to understand the resources that marginalised communities have to overcome exclusion.

Szreter (2002) and Rohe (2004) explain linking social capital as a type of bridging social capital, with the particularity of explaining relations of exchange between groups of different contexts, where differences in power are a fundamental part of the interaction. Thus, linking social capital is a way of explaining not only the horizontal relations present across civil society, but a way to critically consider the vertical relations as well, and answer relevant questions about imbalanced power relations, such as: state-civil society; impoverished communities-development agencies; public-private; formal-informal; rich-poor.

The fourth type of social capital, developed by Rydin and Holman (2004) is bracing social capital. It is *"concerned with strengthen[ing] links across and between scales and sectors, but only operates within a limited set of actors. It provides a kind of social scaffolding"* (Rydin & Holman, 2004, p. 123). Bracing capital is related to linking, as both recognise vertical links, *"the difference between the two notions is that bracing social capital does not exclusively pertain to connections with people in power or in formal institutions; it includes connections of people who have ties with various groups, whether formal or informal, across sectors, across government levels or localities"* (Kusakabe,

2013, p. 14). Bracing capital is a combination of bonding and bridging capitals (Holman & Rydin, 2012), but it has the particularity of being strategic in locating and building the relevant linkages across sectors and scales to effectively tackle a particular issue or advance an agenda. It works by improving information flows, trust and reciprocal benefits between actors across sectors in pursuing of a common goal at the micro or macro scales. (Rydin & Holman, 2004)

An example of this is the development of the 'Soap Movement' of Shinga housewives, in the Shinga prefecture in Japan provided by Kusakabe (2012). In this example, the author describes how sustainable goals were achieved through collective action, enhanced by bracing capital. In the example at hand, a local community who benefited from the ecosystem services provided by Lake Biwa, saw how these benefits were being jeopardised by a Red Tide created by the excessive use of synthetic detergents. They started a grassroots movement that influenced local authorities to prohibit the use and commercialisation of synthetic detergents, and later this led the national government to create policies on water quality management. Kusakabe (2012) recognises that the soap movement followed a collective action trajectory as the one described by Rydin and Falleth (2006). In this trajectory different types of social capital played a relevant role in the achievement of a collective goal. That is, bonding served in the framing of the problem within the affected communities; bridging facilitated the flow of information between communities; and bracing consolidated a set of strategic connections between networks that ensured the achievement of the collective goal, by assembling all the available resources (Kusakabe, 2012). As it is possible to observe, bracing social capital recognises both horizontal and vertical connections among groups of bonding, bridging and linking social capital. However, bracing social capital does not refer to the connections between generic groups of bonding, bridging, and linking social capital, rather than that, bracing social capital illustrates the connections between a specific set of actors whose connections are strategic for the advancement of a particular collective goal.

A recent addition to the types of social capital is identifying, coined by Lollo (2012). This type of social capital is influenced by the work of Coleman and Bourdieu, in the sense that it locates social capital at the individual level and is identified within the social structure where an individual is embedded. This type of social capital emerges from the degree of concentration of social contacts around a single individual within a group of individuals who share a common interest (e.g. political parties and religious groups). The function of this type of social capital is to *"monitor one another through social sanction and at the same time the group structure provides some individual with a larger amount of expectations (we may think to the political or religious leader) that can be used to reinforce his control over the group"* (Lollo, 2012, p. 12). This type of social capital is recent and remains in a rather theoretical state, since little empirical research has been conducted using it. However, empirical research relying on identifying social capital might provide examples of the dynamics followed by social groups in assigning leadership at its interior.

As it is possible to see, the pursuit and achievement of collective goals can draw upon the combination of all the forms of social capital here described (Durlauf, 2002). That is, bonding social capital is necessary to bring together local groups interested in solving local issues, which can later gather momentum by joining forces with other groups facing similar circumstances, and gain sufficient social capital to access vertical forms of power. *"This means that social capital is not really a tool at all but rather a variety of strategies, each of which needs to be tailored to the specific policy problem at hand and the specific local context"* (Rydin & Holman, 2004, p. 131). According to Grant (2001), who analyses the strategies deployed by two poor communities in Guatemala City to negotiate their development, successful results depend on the utilisation of a combination of different types of social capital. According to her findings, bonding social capital was required so that communities were able to act as a cohesive unit. Bridging was used to gain strength by connecting with other community organisations with similar agendas. Finally linking social capital was used to access more powerful groups relevant for the advancement of their goals. Similar strategies were observed by Hutchinson (2004) while studying the community improvement of a deprived immigrant neighbourhood in inner Los Angeles, in which an arrangement of different types of social capital was also instrumental for the achievement of collective goals.

In a review of Putnam's historical cases of successful grass root social movements (settlement house movements in Chicago, sanitarians, and suffragettes), Szreter (2002) notes a similar trajectory. In these cases, collective action relied on a combination of bonding, bridging, and linking social capitals. Szreter (2002) notes that grass root social movements started with small locally-based organisations coming together to achieve particular goals (practical problems). This allowed the empowerment of small groups of people that previously had little voice in public affairs (local or national) to raise their demands. Secondly these locally-based groups began to reach other groups facing similar problems elsewhere to create national networks; and thirdly gain the attention and assistance of well-placed cross-class allies and the state. Szreter recognises that their success in generating change relied on bonding, bridging and linking social capital, while Rydin and Holman (2004) consider that groups that build bonding, bridging and bracing capitals have more possibilities to succeed. Furthermore as De Souza Briggs (1997) explains, social capital builders also need to assess what kind of relations are needed for the achievement of a particular purpose, across networks and scales, operation that perhaps can be explained through operation of few individuals as in bracing social capital (see: Rydin & Holman, 2004).

The operationalisation of social capital

A common ground between all proponents of social capital are the components of its operationalization: social networks, and its related patterns of social norms of trust and reciprocity that enable social networks in facilitating collective action to pursue com-

mon objectives (Lollo, 2012; Putnam, 1995a, 2000b; Woolcock & Narayan, 2000). Grant (2001) notes that while norms of trust and reciprocity *"predispose people toward mutually beneficial collective action, structural elements of social capital facilitate such action"* (p. 977).

Social networks refer to the social structures in which individuals operate, and constitute the most tangible and observable dimension of social capital (Lollo, 2012; Newton, 1997). These structures emerge from the patterns of repeated interactions between members of society, in which individuals invest in participating to yield the benefits that emerge from collective action (DeFilippis, 2001; Rohe, 2004). According to Sabatini (2006) there are different types of social networks that correspond to different types of social capital: *"informal networks of strong families ties (bonding social capital), informal networks of weak bridging ties connecting friends and acquaintances (bridging social capital), formal networks connecting members of voluntary organizations (linking social capital) and formal networks of activists in political parties."* (Sabatini, 2006, p. 23)

However, DeFilippis (2001) and Szreter (2002) note that not all social networks are as effective as others in achieving collective goals. They explain that this is due to the position and relation to power that certain networks have, which allow its members to generate greater returns (DeFilippis, 2001). On the other hand, people with little connection to power also use networks to initiate mass actions to challenge their unequal access to power (Welzel et al., 2005).

While social networks are the tangible elements of social capital, its other operational dimensions (social norms of trust and reciprocity) are its intangible elements (Newton, 1997). These intangible elements are embedded in social networks and enable cooperation for collective action, and constitute the element that transforms social relations into capital, *"when participants can rely upon another to uphold social norms and to reciprocate help"* (Light, 2004, p. 2). However, Lollo (2012, p. 4) notes that *"not all networks and not all relationships are conductive to social capital but only those characterized by trust and reciprocity among individuals."*

In this sense, social capital requires social networks to operate, as well as the embedded social norms that facilitate the cooperation between members of the network to be productive in pursuing common objectives. It is also necessary to locate the sources of power and influence of the network to understand their effectiveness in achieving shared goals.

Social capital and its limitations

Despite the massive attention that the concept of social capital has gained during the last twenty years in academia and in public policy, serious criticisms on its limitations have been noted in scholarship. The limitations and criticisms addressed in this section are: the conceptual vagueness in the use of the concept; some scholars considered it as

theoretically weak; it is often used a-critically as an inherently positive social feature, the use of the concept tend to fail in addressing and recognising the role of the state as part of the social capital framework, and finally, social capital tend to be acknowledged in functioning democracies, ignoring its presence in authoritarian regimes.

One of the main criticisms of social capital is that there is no consensus in its definition, which makes the term conceptually vague (Durlauf, 2002). Durlauf argues that even within Putnam's work there are multiple understandings of social capital. These goes from *"connections among individuals-social networks and the norms of reciprocity and trust worthiness that arise from them"*, to equating the term with *"Fraternity, as the French democrats intended it"* (Putnam, 2000, p. 19 cited by Durlauf, 2002, p. 260), all being different from the definition present in the 'Bowling Alone' book. Some identify that the vagueness in the use of the term made by Putnam comes from Putnam's use of Coleman's definition, which according to DeFilippis (2001), lacks in clarity, and opens the door to Putnam locating social capital in trust-based associations, which is only one of the multiple examples offered by Coleman.

This is not the only criticism that social capital (as presented by Putnam) has encountered. Some other critics argue that the concept is theoretically weak as there are no theoretical bases to sustain the transition between the individual scale of analysis offered by Bourdieu and Coleman, to the collective social capital scales presented by Putnam (DeFilippis, 2001; Portes, 1998; Portes & Landolt, 2000). This can even reduce its heuristic value, as the concept becomes *"synonymous with each and all things that are positive or desirable in social life"* (Portes & Landolt, 2000, p. 535).

Following the criticism raised by the transition from individuals to collective benefits of social capital, is the circularity of Putnam's argument (Harriss, 2002; Portes, 1998), as explained by Portes (1998): *"[a]s a property of communities and nations rather than individuals, social capital is simultaneously a cause and an effect. It leads to positive outcomes such as economic development and less crime, and its existence is inferred from the same outcomes"*, which makes it difficult to measure (Portes, 2000, p. 19). Another criticism is that the term has been largely used uncritically as a positive social feature, ignoring its possible negative outcomes and externalities such as antisocial behaviours, or social exclusion. In this sense social capital can be negative when the norms and values of reciprocity and trust do not benefit the whole society, but a specific group (Harriss, 2002).

Perhaps the most acute limitation of the concept as presented by Putnam, are the policy recommendations that rely on his understandings. This is because Putman's understandings tend to focus too much on locally-based civic organisations to develop the 'right' kind of collective action, which in turn would yield with all kinds of societal benefits. However assigning that amount of responsibility to locally-based civic organisations

seems rather naïve (Szreter, 2002). Another source of concern is its failure to account for power dynamics, focusing too much on the agency of local civic organisations and not sufficiently enough on the structure of the system (DeFilippis, 2001; Rohe, 2004).

Furthermore, a major source of concern is that this perspective ignores the role of the state in facilitating social capital and explicitly disdains politically and ideologically embedded organisations as possessors of social capital (DeFilippis, 2001; Szreter, 2002; Welzel et al., 2005). These politically and ideologically embedded organisations are especially important for linking social capital to understand uneven power dynamics, where different groups might have to challenge power in order to advance their collective goals (Harriss, 2002). This is particularly relevant in development processes, where poor communities at the losing point of a set of power relations need to change imbalanced power relations to develop (DeFilippis, 2001). In this sense, Grant (2001) observes that in the Latin American context, clientelist6 relations between state patrons and poor communities can be understood as linking social capital, in which only participating parties benefit. State patrons benefit from obtaining political support, and poor communities engaging in clientelist practices get solutions (or the promise of solutions) to their demands.

A final limitation is that most social capital studies have been conducted on functioning democracies, and thus largely ignore authoritarian regimes (Fox, 1996). In his study on the political construction of social capital in Mexico, Fox (1996) discusses the pathway in which meaningful civil collective action (i.e. seeking the common good) can form in an authoritarian context. He notes that two factors are fundamental in the pathway towards meaningful collective action, one is the possibility of locally-based civic groups to coalesce with other groups beyond the most local level; for this it 'is necessary to create respect for freedom for association' (Fox, 1996). In the Mexican context freedom of association beyond the local level is often obstructed by the state (Fox, 1996). The second factors is the presence of elite trans-class allies (i.e. allies within the state) willing to respect or even facilitate the association of groups beyond the local level. These two factors, when combined, can forward meaningful civic collective action by facilitating the definition of common goals, and more importantly 'scaling up' the organisation to promote their interests. (Fox, 1996).

In sum, the concept of social capital has to be used critically. First, it is necessary to understand that there are multiple and competing definitions of social capital, and each of them might be useful to explain different phenomena (from finding a job to community development) and scales of analysis (from the individual level to national scales). Second, it is also important to recognise social capital is not necessarily an inherent good feature

6 Clientelism is: "giving material goods in return for electoral support, where the criterion of distribution that the patron uses is simply: did you/will you support me?" (Stokes, 2009-07-02)

of social groups, as it might produce social exclusion or other anti-social outcomes (i.e. organised crime). Finally, the effectiveness of social capital might be closely linked to the active role of the state, either in facilitating or hampering it.

Role of Social capital in achieving development and transformation

Perhaps one of the catchiest features of social capital is its role in development. Putnam (2000b) claims that where social capital flourishes, neighbourhoods, cities and even nations prosper, develop, and perform more democratically. This argument has even been taken by the World Bank as the 'missing link' for development (Grootaert & Woolcock, 1997). However, this has also been one of the main sources of criticism against the concept of social capital as presented and popularised by Putnam, because it fails in addressing issues of power since Putman's understanding is disconnected from other types of capital, particularly economic capital. According to DeFilippis (2001, p. 799), reconnecting the concept of social capital with economic capital would require *"to create social networks that allow individuals to realize capital, while simultaneously allowing these networks to realize the power needed to attract and control that capital (for the benefit of those in the networks)"*.

Putnam (2000b) argues that social capital is located in non-confrontational, and rather apolitical organisations of voluntary participation to solve common problems, and conversely that challenging associations might present contrary effects for social capital. The conflict with this interpretation of the role of social capital in development, and in general for any type of transformation, is that transformation requires to challenge the status quo. Harriss (2002) sees the danger of adopting Putnam's argument in locating social capital within organisations without any political meaning as a powerful tool for groups in power with vested interests in maintaining business as usual. Indeed, this argument provides the opportunity to simulate a participatory democracy, without the inconveniences of movements with conflicting politics and values that might find and challenge the sources of collective problems in the prevailing unbalanced relations of power across different groups of society (DeFilippis, 2001). Depositing development in the type of organisations described by Putnam, as NGOs and local participatory associations is also dangerous as they are not necessarily democratically accountable. And furthermore, by doing so, this might serve as an argument to expect that the most disadvantaged groups in society have to address their needs by themselves, and thus as an argument for the retreat of the state and the increase of expenditure cuts (Harriss, 2002; Lehtonen, 2004).

The discussion on this matter flared up in the United Kingdom since the implementation of the 'Big Society' agenda, *"aimed at prompting greater levels of citizen engagement and responsibility"* (Lister, 2015, p. 352). In the planning realm the 'Big Society' agenda takes the form of Localism, *"a partial and voluntary decentralisation of the state to the community or neighbourhood scale"* (Holman & Rydin, 2012, p. 72), which relies on social capital to function adequately. However, as explained by Holman

and Rydin (2012), relying too much on social capital if there is not sufficient meaningful and representative public engagement, could have counterproductive consequences. Holman and Rydin also argue that lack of sufficient public engagement could be overcome with bonding social capital, which on the other hand can potentially reduce the ability of a community to engage in wider planning concerns beyond local boundaries and foster NIMBYism, if bridging capital is not present. And at the same time, the implementation of plans can be threatened by the lack of linking and bracing capital to create effective partnerships at various scales and networks.

However, Szreter (2002) through his alternative lecture of Putnam's historic cases in the United States of America, has shown that the decline of social capital is more acute in periods where the accountability of the state also declines. This is an argument shared by Edwards and Foley (1997), who believe that the decline in the social capital of the American society is due to the retreat of the welfare state. Furthermore, Lehtonen (2004) by citing Woolcock and Adger recognises the central role of the state in facilitating social capital while providing an adequate context by providing infrastructure, planning and regulating activities to stimulate economic regeneration (Szreter, 2002), and by performing democratically to shape the development of social capital (Lowndes & Wilson, 2001).

Thus, in order to understand the possibilities of social capital for transformation and development, it is necessary to move slightly away from Putnam's central argument of solely locating social capital in organisations of apolitical voluntary participation. Moving away from Putman's understanding of social capital implies, to recognise the role of the state (Lister, 2015; Lowndes & Wilson, 2001; Szreter, 2002), address issues of inequality in power relations, and integrate the role of politics and ideology (Szreter, 2002). It is also important to reconsider the economic value of the social capital concept (DeFilippis, 2001) as a source of power and influence (Portes, 1998); and to recognise non-institutional organisations, that confront power from below, such as boycotts, strikes, demonstrations and petitions, as indicators of the effectiveness of networks in producing collective action (Welzel et al., 2005).

2.3 Theoretical framework: Social capital and resilience

Social capital has been considered in the context of resilience, primarily within the disaster relief and recovery debate (Daniel P. Aldrich & Meyer, 2015; López-Marrero & Tschakert, 2011), by focusing on the self-organisation capacities of people to act in face of a disturbance. However, there is also a growing interest in looking, more generally, to the potential of social capital in resilience to explain the adaptability of coupled social-ecological systems: resource co-management (Adger, Brown, et al., 2005; Kizos et al., 2014), historical (Endfield, 2012), and in processes of transformation (Pelling & Manuel-Navarrete, 2011).

The interest in the role of social capital in resilience discourse is related to its explanatory possibilities of community engagement for acting collectively, to reduce the vulnerability to, and as a form of adaptation to climate change (Endfield, 2012), since *"community involvement has been widely understood to be vital to processes of building resilience"* (Bahadur & Tanner, 2014, pp. 204-205). According to Tyler and Moench (2012) group's auto organisation is highly relevant to act collectively to environmental hazards, for example through local infrastructure improvements, and *"civil society and citizen mobilization in creating the pressure and partnerships for enhanced urban resilience"* (Bahadur & Tanner, 2014, p. 204).

Within the debate of disaster relief and recovery, social capital has been stressed as a normatively desirable feature. It is thought of as a tool to create opportunities for self-organisation and partnerships for collaboration to collectively deal with stressors (Daniel P. Aldrich & Meyer, 2015), reconstruct and reorganise as a collective goals, as well as mechanism to disseminate information about the construction of more resistant structures with local collective knowledge (López-Marrero & Tschakert, 2011).

Adger (2003), while explaining the process of co-management of ecosystems, which is understood as the shared responsibility between resource users and the state, recognise the importance of social capital as threefold, where the interplay of bonding, bridging and linking social capitals are fundamental. He explains that bonding (within resource-user groups), and bridging capitals (with similar groups) are important to share best practice and lessons, and to act collectively in socially understanding crises, overcoming inertia and fostering change through negotiating and sharing knowledge with the state (linking social capital).

Another example of the combination of social capital and resilience concepts in the study of the co-management of resources, is the one provided by Kizos et al. (2014) analysing the resilience of mountain ecosystem services in the Asteroussia Mountains in southern Crete, Greece. Kizos et al. (2014) describe how the resilience of ecosystem services (understood as the stability of the ecosystem) was affected by the complex relation of macroeconomics, institutional behaviour and social capital. The case at hand spans across three macroeconomic moments: stagnation, growth, and crisis. During the economic stagnation period, small competing and non-cooperative groups of bonding social capital depended on shared ecosystem services (grazing land) for their economic activities (cattle raising). Then in times of economic growth, cash flows and state subsidies made it possible to transcend ecosystem limits through the import of cattle feed. Finally, the disruption of the current macroeconomic crisis reduced the availability of subsidies and cash flows, increasing the pressure on the ecosystem, reducing its capacity to sustain farm activities, affecting in turn the resilience of the area. Institutional behaviour in the provision of subsidies, done in a clientelist way, increased feelings of distrust across bonding groups, reducing the possibilities for effective collective action in ecosys-

tem co-management, reducing in turn the resilience of the ecosystem services on which economic activities of the area relied. What is important about this empirical example is that the state, macro-economic changes, and social capital interact in the resilience of a particular ecosystem.

From a historical perspective, Endfield (2012) analyses the case of pre-Hispanic and colonial Mexico through a series of historical examples, using historic archive sources; she shows the complex interactions between environment and society, where climatic stressors served as opportunities for learning and innovation towards relevant transformations. Endfield (2012) explains how in response to floods and droughts, actors collectively developed mechanisms that transformed crisis into opportunities. In the case of the drought, there were spontaneous and official state-led collective actions to provide relief. In the case of the flooding case of Laja River, in Celaya, Mexico, collective responses took form of collectively identifying the causes of the crisis and possible solution paths, which were used to inform the state and then, the state fostered collective action. Collective action was taken in two ways, due to class and race divisions prevailing at the time: Spaniards provided the necessary financial resources, while indigenous people provided the necessary labour for the construction of a dam. In these examples, it is possible to observe the participation of multiple stakeholders at different levels (bridging and linking social capitals), acting collectively to solve climate-related problems.

Social capital has also been used to understand transformational processes as part of the resilience framework. Pelling and Manuel-Navarrete (2011) argue that there is a gap in understanding how transformation occurs in the social-ecological resilience framework. Using the example of the Mexican Caribbean, they analyse what a resilient social-ecological system looks like. They argue that *"[i]t has been observed that history proceeds through periods of institutional stability, challenge, crisis, and reorganization"* (Pelling & Manuel-Navarrete, 2011, p. 2). In these periods local and endogenous social processes can provide sources for learning and experimentation to transform a system, and as result from this process of transformation new winners and losers emerge, as the balance of power between the actors involved changes.

Pelling and Manuel-Navarrete (2011), while describing post-disaster scenarios in the Mexican Caribbean, show how previously centralised forms of governance broke as result of hurricane Dean (hurricane Dean hit the Mexican coast in August 2007). This occurred because the weakening of the state during the crisis forced the local community to act collectively to overcome the crisis. Collective action required the formation of new ties of collaboration at the interior of the community for reorganisation and reconstruction efforts, creating a newly sense of willingness to act collectively. From this perspective, the crisis allowed the social transformation towards collective action in the absence of the state. In their paper, Pelling and Manuel-Navarrete (2011) also recognise that when the state recovered its capacity, the need to act collectively was no longer required. Thus, this

paper is not arguing for the retreat of the state, rather than that, it recognises the role of collective action during times of crisis, and also shows how crises opens new opportunities for improved state and civil society collaboration.

The examples described show a strong connection between social capital and resilience in its different understandings, from the self-organisation capacities of society to act collectively at moments of crisis; to the co-management of change in the resilience of social-ecological systems. However, the most important connection is the one with socio-ecological resilience, which can have multiple trajectories and possibilities, from the destruction of the ecosystem and the diminishing of the resilience of a system, to the transformation of the environment in response to climatic challenges, and the formation of social capital as a response of climatic challenges.

Research gaps

This literature review identified four gaps related to the contribution of social capital to urban resilience from a social-ecological perspective. The first refers to the scale of analysis: most of the literature on urban resilience focuses on the regional or city scales (Adger, 2000; Endfield, 2012; Kizos et al., 2014; Manuel-Navarrete, Pelling, & Redclift, 2011). Those studies considering the built environment, understand cites as a rather homogeneous aggregate. However, urban resilience recognises the relevance of considering the differences of resources among residents of a particular city that *"control agendas, decisions and outcomes around resilience-building, and the processes that support or obstruct different individuals, groups or organizations in exercising this control"* (Bahadur & Tanner, 2014, p. 201). Hence, the importance of understanding urban resilience at the neighbourhood scale. The second gap refers to the impact of the configuration of the balance of power in the construction of resilience. Some studies have highlighted the impact of unbalanced power between social groups in which actions oriented to support the resilience of a particular group negatively affect the resilience of others (Bahadur & Tanner, 2014; Ernstson et al., 2010). However, there is a research gap as to how neighbourhoods with low access to sources of power, particularly self-help settlements, can challenge this condition to achieve urban resilience.

The third gap is how social capital can serve to process environmental stresses (challenges and crisis), and convert them into opportunities to transform the built environment and improve the resilience of a city in the long run, particularly at the neighbourhood scale. Hence, it is necessary to understand the contribution of different types of social capital to the resilience of cities at the micro-scale. And fourth, it is necessary to *"develop a strong theoretical base for addressing matters of power, conflict, contradiction and culture"* (Wilkinson, 2012, p. 160) for urban resilience to be translated into planning theory.

2.4 Conclusion: The use of social capital and resilience in this research

To address the identified research gaps, this research draws on a theoretical framework that is threefold. First, social capital is going to be understood as the social rules of trust and reciprocity embedded in social networks that enable them to act collectively in the pursue and achievement of common goals that could not be possible in its absence (Bourdieu, 1989; James S. Coleman, 1988; Putnam, 2000b). Social capital is a quality shared by members of social networks (Bourdieu, 1989; James S. Coleman, 1988), and its related patterns of trust and reciprocity that enable social networks to act collectively to pursue common objectives (Lollo, 2012; Putnam, 1995a, 2000b; Woolcock & Narayan, 2000). Its function is productive, as it focuses on achieving common goals, and as such social capital has value (Bourdieu, 1989; James S. Coleman, 1988).

Second, urban resilience is defined (adapted from the urban resilience understanding) as the historical process in which urban areas evolve in the face of environmental uncertainties and nonlinearities and allow urban populations to increase their standards of living and develop in an inclusive fashion (Adger, 2000; Leichenko, 2011; Pickett et al., 2004). Urban resilience depends on the ability of cities to be flexible, adaptable and transformable across dimensions (social, and spatial) (Folke, 2006; Pelling, 2011), scales (‘in cities’ and ‘of cities’) (Ernstson et al., 2010), and timeframes (past, present, and future) (Adger et al., 2009; Satterthwaite, 2013a; Tyler & Moench, 2012).

Third, the contribution of social capital to urban resilience resides in its explanatory possibilities of community engagement of social networks in acting collectively to transform their settlements, as a form of collective goal, to face environmental challenges (Endfield, 2012). Hence, it is important for understanding community engagement in reducing the sources of their vulnerability as a form of adaptation to climate change (Endfield, 2012). For the achievement of a collective goal, social networks depend on the utilisation of a combination of different types of social capital (bonding, bridging, and linking). Bonding: a community can act as a cohesive unit in framing an environmental challenge or crisis. Bridging: to gain strength by linking with other community organisations facing the same problem. Linking: to access more powerful groups that help them to mobilise resources to overcome the environmental challenge or crisis (Grant, 2001; Kusakabe, 2012; Rydin & Falleth, 2006).

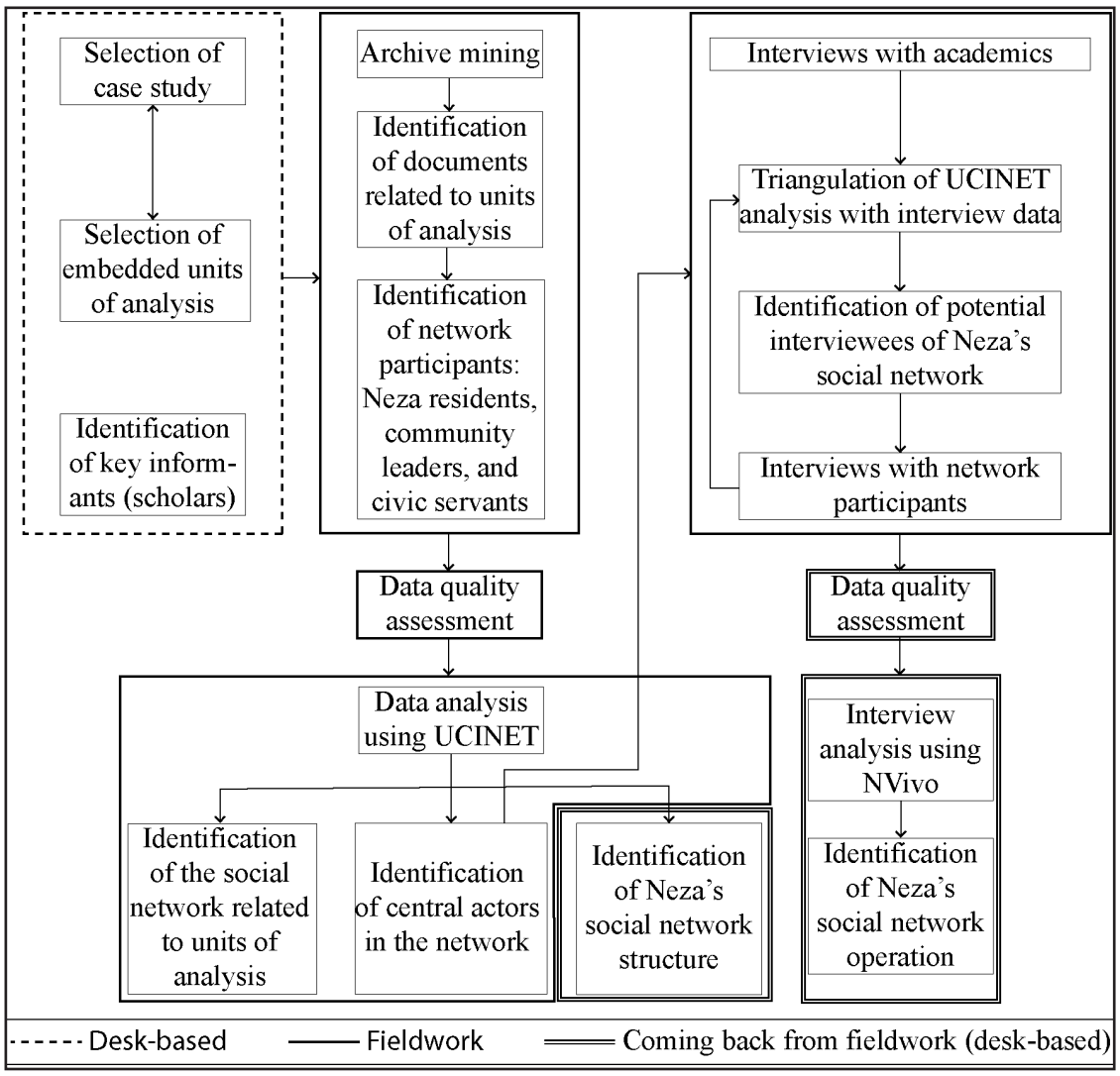
This chapter has addressed the concepts that guide this research: urban resilience, and social capital. It has been argued that the concept of urban resilience, seen from its social-ecological understanding, offers a good standpoint to be incorporated into planning theory, and practice, as it describes what cities should do to allow its continued adjustment through history, in face of unpredictable changing conditions; while having as normative goal the improvement of the wellbeing of urban residents. On the other hand, the concept of social capital has been discussed as an explanatory tool for the collective actions of social groups seeking for the achievement of collectively defined goals. In this

chapter, it has been argued that the usefulness of the concept of social capital depends on expanding traditional understandings, mainly those of Putnam, that locate social capital in apolitical organisations, and does not address the role of the state as relevant in the social capital framework. Thus, this chapter has recognised the need to expand this notion to incorporate political organisations that challenge the status quo, and the state as relevant to explain how communities transform. This chapter also identified the need to understand the role of social capital in urban resilience at the neighbourhood scale, as a gap in knowledge. To address this gap a theoretical framework that links urban resilience, and social capital is introduced, suggesting that the concept of social capital is an explanatory tool to understand collective action of urban residents addressing the need to make pertinent adjustments to their cities in order to navigate changing environmental circumstances. The following chapter discusses a methodological approach to empirically test the proposed theoretical framework.

3. Methodology, a single case study with multiple embedded units of analysis

The purpose of this research is to understand the role of networks of social capital in the resilience of self-help settlements. The previous chapter addressed the state of the art of the two main concepts that inform the research, social capital and urban resilience. Chapter 2 shows that the collective actions of social networks play a positive role in the construction of resilient urban environments. However, a research gap was identified, relating to how networks of social capital operate in self-help settlements to achieve urban resilience. Further research is needed to fill the identified gap in knowledge, which entails conducting empirical research in self-help settlements at the neighbourhood scale. This chapter discusses how this thesis is designed to address this research gap. It therefore presents a case-study approach focusing on Neza, a municipality in the Metropolitan Area of Mexico City; and considers six collective goals as embedded units of analysis. This approach considers that the resilience of Neza is the result of civic engagement in collective goals at the local level. Thus, civic engagement is the focal point of the research. This leads to two research sub-questions: who participated, and how. In consequence, a mixed methods approach was undertaken. On the one hand, civic engagement around the collective goals was studied following the methods of Social Network Analysis (SNA) (quantitative) to understand who participated. And on the other hand, interview data was processed using thematic analysis (qualitative), to understand how local actors engaged in collective goals. This research was conducted in three stages (summarised in Figure 1). The stages are desk-based (research design, definition of settings and participants), fieldwork (collection of empirical data and preliminary analysis), and coming back from fieldwork (analysis of collected data, and writing-up the thesis). These are discussed in turn in this chapter.

Figure 1. *Research design*



Source: Author's elaboration.

3.1 Research approach

The type of research questions proposed for this research seek both exploratory (to locate the units of analysis and social networks) and explanatory (to explain the operation of social networks) responses. For this reason, as suggested by John W. Creswell and Plano Clark (2011), who argue that mixed-methods can be used to address both exploratory and explanatory questions; a mixed method approach is used for this study. Experienced researchers looking into social capital suggest the necessity of blending qualitative and quantitative methods (Dudwick et al., 2006). This is done because social capital is multidimensional, as it encompasses the structure of social networks (quantitative), the social rules that allow the network operate (qualitative), and the outcomes of the social network (qualitative and quantitative) (Dudwick et al., 2006). Furthermore, qualitative and quantitative research methods are seen as complementary, as the weaknesses of one approach can be compensated by the strengths of the other, while the outcomes of both can be triangulated to add validity to the results of the research (Johnson & Onwuegbuz-

ie, 2004). However, a disadvantage of mixed methods is that it can be time consuming, and requires a great understanding of the strengths and weaknesses of qualitative and quantitative methods for the specific research at hand (John W Creswell, 2014; Johnson & Onwuegbuzie, 2004; Johnson, Onwuegbuzie, & Turner, 2007).

Social capital studies are suggested to be performed in context (Dudwick et al., 2006), and require real-life situations to look at. An appropriate method to study real-life contexts, is 'case study research' (Bromley, 1986; Scholz & Tietje, 2002; Yin, 2009), since they provide in-depth information and allow the identification of the general features of a social phenomenon (Gerring, 2004). This study focuses on a single case study (Neza, a self-help settlement in the Metropolitan Area of Mexico City that was developed under challenging environmental and institutional conditions), with embedded units of analysis (the set of infrastructures and institutional arrangements that allowed Neza to overcome its challenging initial conditions). The rationale of the selection of the case-study, and its embedded units of analysis is discussed in subsection 3.2, and an extended discussion of the case study is presented in Chapter 4. A case-study with embedded units of analysis involves multiple objects which sum constitutes a larger single unit (Scholz & Tietje, 2002; Yin, 2009). By analysing each of the parts that constitute the case-study from an individual, yet interconnected perspective, a comprehensive understanding of the case can be achieved, which can enhance the insights of the observed phenomenon (Yin, 2009). However, it is important to recognise that an embedded case study design also has its pitfalls. The most important is using embedded units as separate cases, failing in addressing them as part of a wider unit in which they are contained (Yin, 2009). In this case, it is important to bear in mind that the objective of the study is to see the embedded units of analysis as means to build a comprehensive understanding of the case in which they are embedded.

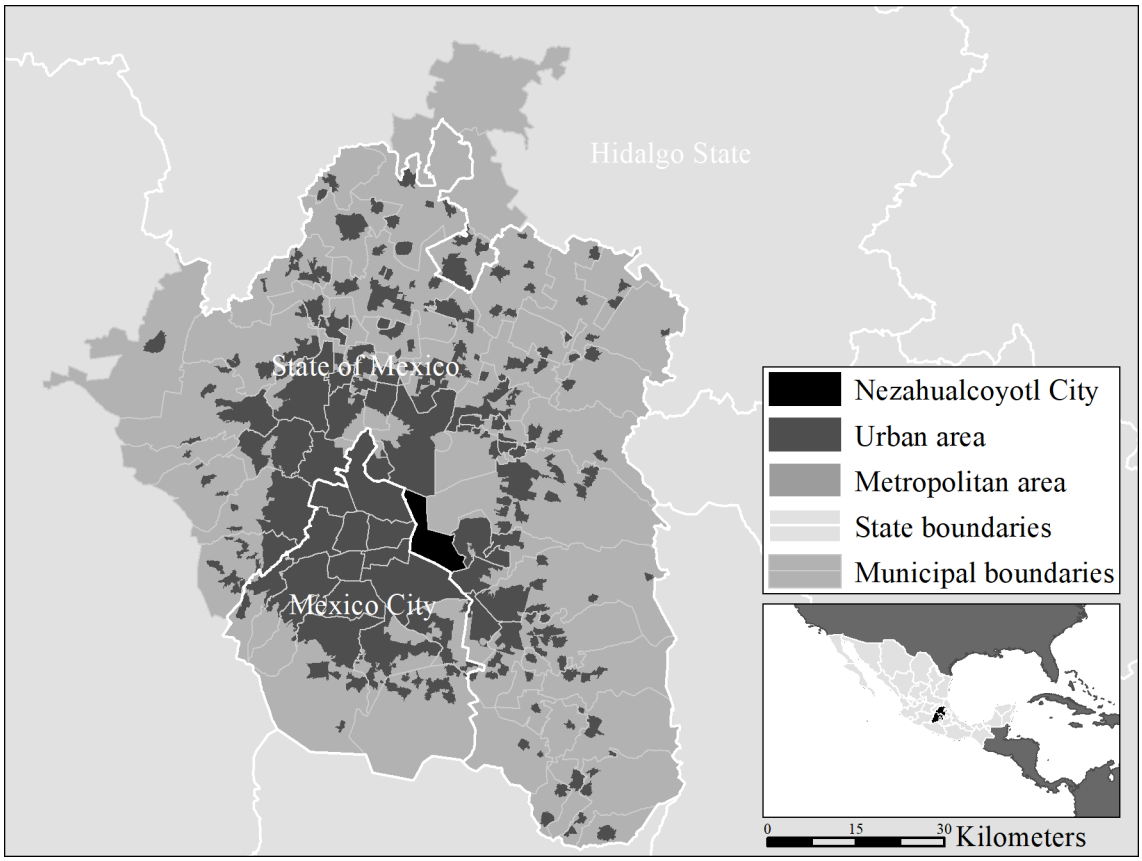
3.2 Setting and participants

In this subsection, the rationale for the selection of the case-study, its embedded units of analysis, and interviewee sources for this research are discussed. The criteria for the selection of the case study was to identify a self-help settlement that had successfully coped with challenging environmental conditions due to the direct participation of social networks operating in the case-study. Interview participants were selected considering either their knowledge of the case-study, or their engagement in the social network that participated in the actions to cope with the challenging conditions of the case study. Following these criteria, two types of interviewees were considered for this study: academics, and members of the social network involved in the achievement of the collectively identified goals. In the following paragraph, the rationale about the selection of the case-study, and participants is detailed.

Selection of case study, and embedded units of analysis

This research required a case-study that complied with the following preconditions: it was necessary to locate a self-help settlement that had successfully overcome challenging environmental conditions through the engagement of local networks of social capital. Thus, the case-study was selected, initially relying on the researcher's intuition and previous knowledge on the urbanisation of Mexico City, and particularly the urbanisation of its metropolitan area. At this stage Nezahualcóyotl was considered as a potential case-study for this research. Nezahualcóyotl or Neza for short is located in the eastern part of the Metropolitan Area of Mexico City (Figure 2).

Figure 2. *Location map. Neza in the metropolitan context*



Source: Author's elaboration, using cartographic information from: INEGI (2010a) and SEDESOL, CONAPO, and INEGI (2010)

As it has been pointed out, an extensive literature review on the case-study is presented in Chapter 3, however, the main reasons that lead to the selection of Neza as case-study are summarised in the following lines. The historic urbanisation of Mexico City took place in an area that is a closed basin, surrounded by a high altitude mountain chain (4,000 metres above sea level) (Romero Lankao, 2010). The basin originally contained a five-lakes system (three of them were saltwater lakes, including Texcoco Lake) that used to merge during rain seasons into a single large lake. Thus, the main historical challenge for the urbanisation of Mexico City has been flooding. After the Spanish conquest of Mexico in the 16th century, Mexico City expanded, reclaiming land to the lakes.

This was done draining out the lake's water into a neighbouring valley, and thus Mexico City expanded as water from the lakes receded (Perló Cohen & González Reynoso, 2006). Draining the lakes lasted nearly four centuries until the early 20th century, when the last lake (Texcoco Lake) was finally drained (Perló Cohen & González Reynoso, 2006). The area formerly occupied by the permanent salty waters of the Texcoco Lake remained un-urbanised, and largely undeveloped as its salty characteristics were hostile for agriculture (Espinosa Castillo, 2005). What was left after the drainage of the lake were saltpans prone to flooding in rainy season, and dust-storming in drought, as the soil did not permitted the growth of vegetation (Espinosa Castillo, 2005).

The area formerly occupied by the Texcoco Lake is where the case-study of this research is located. Neza began to urbanise in the 1940s, as self-help settlement. Neza experienced a rapid process of urbanisation that went from an initial population of a few thousands in the 1940s to 1.1 million in 2010 (Castillo, 2010; INEGI, 2010b). Neza urbanised lacking every public service and infrastructures (e.g. water supply, drainage, public transport, or paved streets), and institutional certainty (e.g. secure land tenure rights, and accountable governance) in an area prone to flooding in rain season, and dust storms in drought (Castillo, 2010; Espinosa Castillo, 2005, 2008; Montejano Castillo, 2008). However, despite the challenging conditions under which Neza was urbanised, it is now considered as a successful case of self-help settlement that managed to break the poverty cycle to become into a vibrant city (Selee, 2011; UN-Habitat, 2011). The development of Neza is largely acknowledged in literature as one that was forwarded by the engagement of locally based social networks who were able to act collectively to achieve the construction of infrastructures, and the achievement of a responsive institutional framework (Bolos, 2003; Espinosa Castillo, 2008; Palma Galván, 2007; Selee, 2011). Neza's resilience was achieved through the construction of a myriad of infrastructures and institutions that were forwarded as collective goals of the social networks that operated locally (see Chapter 4).

The selection of the relevant collective goals as embedded units of analysis considered what environmental challenges were present in the area (e.g. flooding), and what mechanisms were forwarded as collective goals to overcome them (e.g. becoming an independent municipality to facilitate the construction of drainage infrastructures). Thus, the following typology was developed for the selection of collective goals as embedded units of analysis (Table 1): the collective goal responds to an environmental challenge (a), citizen participation is crucial in the achievement of the collective goal (b), it is relevant in the resilience of Neza (c), and identifiable social network associated with the collective goal exist (d). An initial scoping was performed using bibliographical sources (Bolos, 2003; Espinosa Castillo, 2008; Palma Galván, 2007; Selee, 2011), and it was possible to identify five collective goals (embedded units of analysis): independent municipality,

drainage, water supply, paved streets, and public transport. A sixth embedded unit of analysis emerged as part of the data collection stage of fieldwork (archive mining): land tenure.

Table 1. *Criteria for the selection of collective goals as embedded units of analysis*

Collective goal	Type of action	(a)	(b)	(c)	(d)
Municipal independence	Community engagement in organising petitions and demands for the recognition of Neza as an independent municipality		●	●	●
Water supply	Community engagement in organising petitions and demands. Community organisation in the provision of water through water tankers. Also, in contributing with labour and financial resources.	●	●	●	●
Drainage infrastructures	Community engagement in contributing both with labour and financial resources.	●	●	●	●
Paved streets	Community engagement in contributing both with labour and petitions to the government.	●	●	●	●
Public transport	Community engagement in contributing with labour and negotiations with public transport companies and the government.	●	●	●	●
Land tenure	Community engagement in organising petitions and demands for the recognition of Neza residents' land property rights.		●	●	●

Source: Author's elaboration using data from Bolos (2003); Espinosa Castillo (2008); Palma Galván (2007); and Selee (2011)

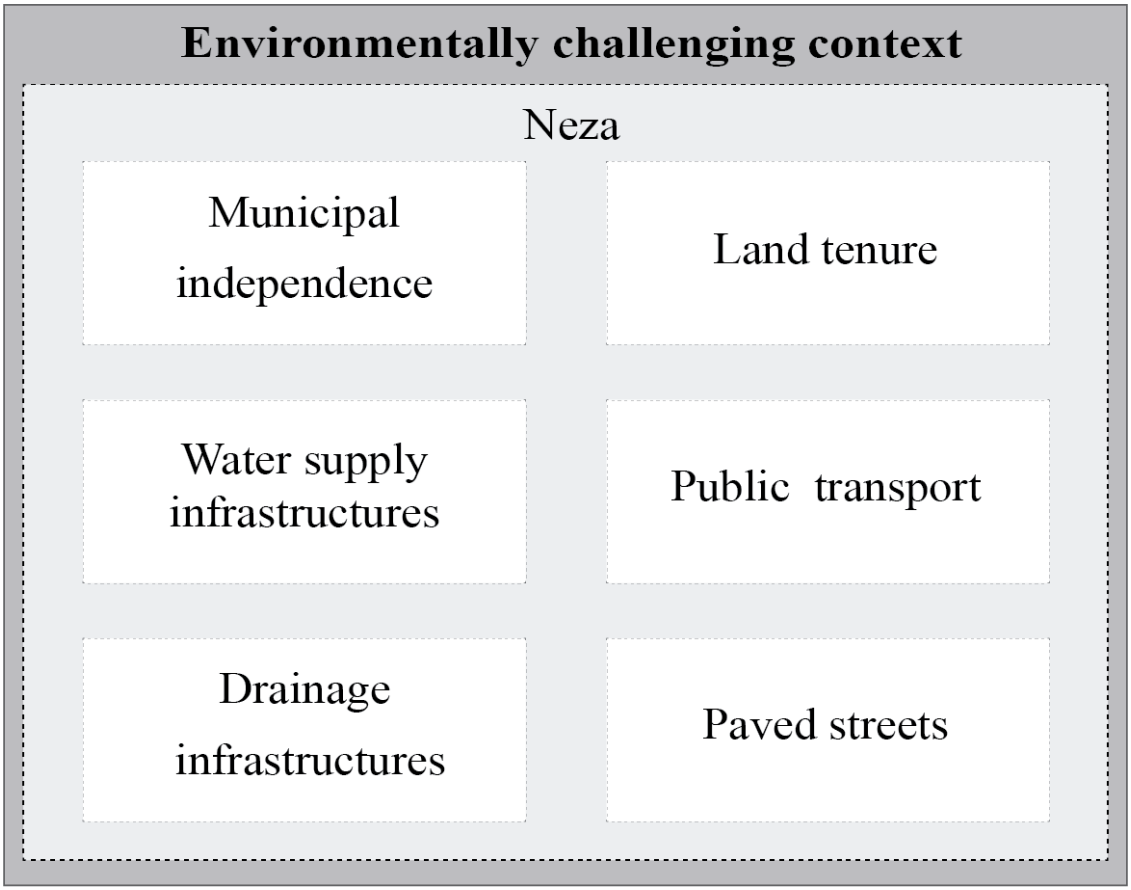
Neza is chosen as a case study to research the role of social capital in the achievement of urban resilience for a number of reasons. First, after facing and coping with several environmental and institutional challenges (flood-prone and dust storm-prone area, uncertainty in land tenancy, and lack of government) Neza evolved into a vibrant city (Castillo, 2001; Espinosa Castillo, 2008; Montejano Castillo & Torres Zárate, 2011; Selee, 2011). Neza is perceived as a successful case (UN-Habitat, 2003), that defied the traditional perception of unbreakable poverty (Selee, 2006) and environmental degradation patterns (Castillo, 2010) as intrinsic of self-help urban development through the collective action of its inhabitants. As such, it is considered as a unique (Castillo, 2010) case to study the role of social capital in achieving urban resilience, which may offer important lessons for areas currently undergoing similar growth patterns (UN-Habitat, 2011).

Secondly, Neza represents a critical case to test both resilience and social capital theories. This is because of its inhabitants' ability of self-organisation to cope with environmental adversity and improve their living conditions through time (Castillo, 2001; Espinosa Castillo, 2008; Montejano Castillo & Torres Zárate, 2011; Selee, 2011). Neza also exemplifies a complex process of continued urban transformation: social, spatial, and

economic, operating at multiple scales and time frames, which are essential in the urban resilience conceptual framework (Leichenko, 2011). Thirdly, the social and political contexts under which Neza was developed –fast rates of urbanisation, self-help urbanisation, unaccountable institutional context, and deteriorating natural environmental conditions-, resonates with what is expected to be the main patterns of urbanisation in countries where urban transition is going to happen in the immediate future in the Global South (UN DESA, 2014).

Thus, this research was conducted in Neza as a single case study with the collective goals that forwarded its resilience as embedded units of analysis (construction of infrastructures –drainage, water supply, public transport networks– and institutional innovations –municipal independence, and secure land tenure rights-); this is because the analysis of Neza's resilience as a whole cannot be possible without the understanding of its different parts (i.e. collective goals as units of analysis) (Figure 3).

Figure 3. *Single case-study, and embedded units of analysis*



Source: Adapted from Yin (2009)

Selection of participants

The number of interview participants in this research was 43, out of which 36 where members of the social network, and seven academic interviewees. The number of participants was determined independently for academics and members of the social network. This was done according to the distinctive objectives that interviewing this two

sets of participants had for the research. The objective of interviewing academics was that of testing the data collection instrument (interview topics), triangulate the information collected in archives (list of network participants), and most importantly, to facilitate the initial contact with members of the social network. While the goal of interviewing participants of the network was to obtain relevant first-hand knowledge on the functioning and operation of the social network in regard with the achievement of the selected embedded units of analysis.

Thus, the number of academic interviews (See list of academic interviewees in Appendix 3) only obey to academic's research being meaningful for the topic of this investigation, and thus the likeliness of being helpful in identifying and contacting members of the social network. Selection of academic respondents was done using judgmental sample techniques (M. N. Marshall, 1996) under the following criteria, scholars must have research interests and published material about: Neza, urban movements in Mexico City, the eastern region of Mexico City, and contemporary history of Mexico City. Interestingly, the final list of academic participants included five academics that were born and raised in Neza (the case-study), which offered the opportunity to have meaningful answers on the evolution of Neza's urbanisation. Also, one of the academic respondents was the son of one of the network participants identified in archive documents, and as such was a longitudinal observer of the network's actions.

The selection of social network participants was done in a slightly more complicated way. First, the type of qualitative data needed to answer the research question was considered. Information requirements were related to the experiences that interviewees had while participating in the social network. Second, information was required from network participants occupying the different theoretical positions available in the network and thus, having different understandings on the operation of the network. Positions in the network were related to the position of actors that resulted from the analysis of the network in terms of the different meanings that a network position might have in terms of social capital (bonding, bridging and linking) (see, chapter 0 for a description of the types of social capital). And finally, once actors occupying all available positions in the network were reached and interviewed, and responses started to be repeated without providing new information, it was determined that a theoretical saturation point was reached, and thus no further sources were needed (Bowen, 2008). The theoretical saturation of interview data was reached when 43 interviews were conducted (see Appendix 4 for a full list of interviewees).7 This sample size is consistent with that suggested for single-case study investigations as an optimal sample has been estimated to be between fifteen and thirty interviewees (B. Marshall, Cardon, Poddar, & Fontenot, 2013)

7 Seven interviews were discarded because they did not provide relevant information for this research. Moreover, one interview was extracted from a book (see next footnote) which means 37 interviews were analysed for this research.

3.3 Data collection

In this subsection, the instruments used to collect data are discussed. Data was collected in two ways: archive mining, and semi-structured interviews. Archive mining entailed the location and analysis of 297 different documents (Appendix 5) recording 297 events in which 706 actors participated over a period of thirty-three years (1953-1986). The second method of data collection used in this research is semi-structured interviews. A total of 43 interviews were used as part of this research, out of which 42 were conducted by the researcher.8 In this section, both methods for data collection (archive mining, and semi-structured interviews) are discussed.

Archive mining: data for the construction of social networks

The method of the collection of data for the construction of social networks was informed by archive mining, given that archive mining is an unobtrusive method particularly useful for historical and longitudinal research (Marsden, 2005). Given that the type of relational data that was being collected for this research was that of the link between network participants and the embedded units of analysis, this was stored in a two-mode matrix. Two-mode matrices are those that show relational data between two different sets of data, whilst a one-mode matrix represents relational data of two equal sets of data (i.e. actor by actor) (see subsection 3.4).

Archive-collected data consisted in 336 documents (Appendix 5) involving 829 actors. The documents were selected considering the embedded units of analysis, regardless of the dates. Dates of the documents span from 1953 until 1986, providing a longitudinal perspective of the case study. To understand the characteristics of the evolution of the social networks that participated in the urban resilience of Neza, documents were organised by date and grouped by embedded unit of analysis. After doing this, 49 not-dated documents were identified, which included 123 actors. Both the documents and the actors included in non-dated documents were excluded from the study. The initial list of documents and actors was reduced to 297 documents involving 706 actors.

Each embedded unit of analysis (collective goal) mentioned in the documents was treated as an independent event. The names of the people signing the document, and those to whom the documents were sent to, were used as the names of the people participating in each event. This information was then transcribed into a two-mode matrix, where rows were used to record participants' names, while columns were used to record events. When

8 The interview of actor C-113 was conducted by Benítez (1999), and published in a book. It is used in this research because it provides personal insights from one of the key actors of the network, the State Governor between 1969-1975, who passed away in 2001. The interview describes in detail the operation of the government in relation to the case-study. Although the interview does not follow exactly the same structure as that of the interviews collected for this research, it shares thematic similarities. As such, it has been analysed in the same way as the others. This is described in the subsection of Data analysis of this chapter (page 69).

event *"a"* was attended by actor *"1"*, a *"1"* was assigned to the cell intersecting if the actor attended the event, and a *"0"* if the actor was not present in the event. This information was stored in form of a two-mode data matrix.

In addition to the names of actors participating in the events, further information was collected, such as actors' gender, and their role (type of affiliation) while participating in the events: members of the community (Neza residents), community organisations, government officials, non-governmental organisations, religious organisations, political organisations, real-estate developers, universities or academics, construction contractors involved in the development of the municipality, and public transport entrepreneurs. Participants' names were ordered alphabetically and numbered from 1 to 706. The capacity of their participation (i.e. community member) was recorded, and coded as follows (Table 2): Neza resident 'A', community organisation 'B', government official 'C', non-governmental organisation 'D', church or religious 'E', political organisation 'F', developer 'G', university or academic 'H', contractor 'I', public transport entrepreneur 'J'. After recording all the selected events, participants were anonymised by coding them using their position in the list and the capacity of their participation. For example, actor 11, being a Neza resident was coded as A-11.

Table 2. *Participant descriptors*

Type of participant	Code	Number of participants	
		Total	%
Neza resident	A	486	67.7
Community organisation	B	51	7.2
Government official	C	121	17.1
Non-governmental organisation	D	0	0
Church or religious	E	0	0
Political organisation	F	3	0.4
Developer	G	33	4.7
University or academic	H	0	0
Contractor	I	12	1.7
Public transport entrepreneur	J	13	1.8
Male participant	-	486	69
Female participant	-	135	19
Organisation participant	-	85	12

Source: Author's elaboration.

The result of the process is the reconstruction of the social networks of the embedded units of analysis of the case-study. From the total of participants 486 (69%) are male, 135 (19%) female, and 85 (12%) organisations, which for the purposes of this research

are considered as individual actors9. The distribution of actors per type of participant is the following: Neza resident 486 (67.7%), community organisation 51 (7.2%), government official 121 (17.1%), non-governmental organisation 0, church or religious 0, political organisation 3 (0.4%), developer 33 (4.7%), university or academic 0, contractor 12 (1.7%), public transport entrepreneur 13 (1.8%) (Table 2). The reason why the presence of actors of non-governmental organisations, religious, and university or academic, is none, is because these actors participated in non-dated documents. Interviews with academics and network participants

Semi-structured interviews were conducted, using as instrument for the collection of data the interview topics and questions proposed by Dudwick et al. (2006) in 'Analyzing social capital in context: a guide to using qualitative methods and data', which is a methodological guide to research social capital developed for the World Bank (interview guide is shown in Appendix 1). The instrument utilised addresses all the theoretical aspects of social capital (networks, trust and reciprocity, collective action, and empowerment and political action), while proposing questions to understand the local context (Dudwick et al., 2006). However, the instrument was adapted to the local context, while preserving the general topics considered in the original instrument. Thus, it was considered that relying on this instrument was useful to inform this research.

Table 3. *Relation between research questions and covered topics in interview guide*

Topic in data collection instrument	Research question	
	a)	b)
Community context	●	●
Groups and networks	●	●
Trust and reciprocity		●
Collective action and cooperation	●	●
Empowerment and political action of social capital		●

a) What network structure supports the operation of social capital for the resilience of self-help settlements?
b) How do networks of social capital operate for the resilience of self-help settlements?

Source: Author's elaboration.

The interview topics contained in the instrument also addressed the research questions of this thesis. While the research questions were not directly asked to interview participants, questions in the instrument did touched upon them, helping the researcher to collect sufficient information to answer them through the analysis of respondents' perspectives. See Table 3 to see what topics in the instrument served to inform what research question.

9 Some of the documents analysed in this research were petitions made by Neza residents through community organisations as independent actors in the network.

Contacting participants

Interviewees were contacted in different ways, depending on their role in the network. As stated earlier, interview sources were of two types: academics and network participants. Thus, a tailored contact strategy was developed for both types of participants. Academics were contacted through their institutional e-mails, which were public in their academic profiles available in the web pages of the institutions where they were affiliated. A recruitment letter (Appendix 8) was sent to each of them inviting them to participate in the research. Social network participants were identified following several strategies. First, a snowball sampling technique was used to locate interview participants. Snowball sampling is a nonprobability sampling technique, in which researchers ask existing interviewees to refer their acquaintances as potential study subjects (Given, 2008). In the case of this research, starting point of the snowball sampling were academic interviewees. Academic interviewees were asked to mediate contact with participants identified in the list prepared by the researcher based on archive data; or actors who they knew participated in the network, even if they were not present in the list (seven interviewees were contacted through academics' recommendation). In total 31 interviewees were located through snow ball sampling. Then network participants reached through the mediation of academics were also asked to mediate contact with further candidates until no further contacts were reached following this procedure, in total twenty-four interviewees were contacted using this procedure. The second strategy followed was the use of public information such as the telephone directory of the municipality to locate further participants. This yielded several participant telephone numbers, but only one network participant contacted in this way agreed to be interviewed. The third strategy followed was the use of the addresses found during archival research to send recruitment letters, three interviews were arranged in this way. Two interviews were collected without relying on either of the previously mentioned strategies. One interviewee (C-451) is a professional acquaintance of the researcher, thus C-451 was reached personally by the researcher. One interview (C-113) was extracted from a book chapter (Benítez, 1999), and thus did not require any recruitment. See Appendix 9 for a full list of interviewees and the sampling strategies used to reach them.

All interviewees were given a hard copy of the information sheet of the research, in which the investigation was described, as well as their rights as participants were clearly explained, stressing the fact that their participation in the study was voluntary, and the anonymity of their personal data was guaranteed (see information sheet, translated into English, in Appendix 6). Also, every interviewee was asked to sign a consent form (translated into English, in Appendix 7). The only interview in which this procedure was not followed was one that was found in a book in which Benítez (1999) did an in-depth interview to Hank González, who is one of the most central figures in the social network (C-113), as he was governor of the State of Mexico from 1969-1975. Governor Hank González passed away in 2001. One of the book's sections was of particular interest for

this thesis, section 2 was dedicated to González' political life, and one of the subsections is entirely devoted to Nezahualcóyotl. This subsection was used to inform this research and analysed following the same procedure as the rest of interviews considered for this thesis (see subsection 3.4 for a discussion on the analysis methods used).

3.4 Data analysis

The quantitative data collected in archives was processed using a software called UCINET, which is a tool for the analysis of social networks, developed by Stephen P Borgatti, Everett, and Freeman (2002). Network visualisations were produced in the software NetDraw 2 (S. P. Borgatti, 2002). The qualitative data collected in the interviews was analysed using thematic analysis. This entailed contrasting the information provided by interviewees with the theoretical implications of urban resilience and social capital identified in the literature review. The thematic analysis was conducted in the software NVivo.

Social Network Analysis, analytical framework

The objective of this section is to briefly explain what Social Network Analysis (SNA) is. After defining SNA, its use as an analytical framework for this research is explained; the different measurements proposed by SNA scholars (e.g. centrality, centralisation, density, and bi-components) are discussed in relation to the key concepts of this research: social capital (bonding, bridging, and linking), and urban resilience. The following subsections discuss the theoretical definitions of social capital and the proposed metrics to measure them using SNA metrics.

What is Social Network Analysis?

Social network analysis (SNA), is both a theory and a methodology used in quantitative research (Stephen P. Borgatti, Mehra, Brass, & Labianca, 2009). Although rooted in mathematical sociology, SNA's metrics have been applied to understand patterns of relational data from multiple disciplines (e.g. psychology, anthropology, medical sciences, ecology, and economy) (Stephen P. Borgatti et al., 2009).

SNA takes as unit of observation pairs of nodes that can be connected with each other, being these typically social actors such as persons, teams, groups, or even ideas, connected with each other by one or more relations (Brandes, 2016; Marin & Wellman, 2011). SNA has been used to map and quantify patterns of connections (ties, links) present within social networks (M. Scott, 2015, p. 451). SNA's approach is defined by the notion that social patterns in which actors are embedded have important consequences for them (L. Freeman, 2004). SNA studies *"the social relationships linking individuals rather than on the individuals themselves"* (L. Freeman, 2004, p. 2).

One of the first difficulties that arise when defining a social network, is the definition of its boundaries. Laumann, Marsden, and Prensky (1989) stress the need to clearly specify the boundaries of a network, the rules to define the actors that are going to be included in them, and the type of relations that are going to be analysed. For the purposes of this thesis, actors (nodes) are chosen due to their participation in some activity or event (Laumann et al., 1989), defined by the embedded units of analysis (collective goals) of this study: independent municipality, land tenure, water supply, drainage, public transport, and paved streets.

There are two main distinctive branches in SNA: the connectionist and the structuralist. Connectionist consider ties as 'pipes' that allow the transmission of flows (e.g. information, ideas, resources, or diseases); while structuralist focus on the topological characteristics of a network, in which two individuals can adopt similar ideas or reach equivalent outcomes by participating in a network if they share a similar position in the network, having a direct tie between them or not. Connectionists argue that an actor benefits from the quality and quantity of resources controlled by her alters; while structuralists consider that actors actively build ties to exploit better yields from their position in the network (Stephen P. Borgatti & Foster, 2003). The analysis of relational data in this research is structuralist, because the type of data that was used for the construction of social networks provides little evidence on the flows transmitted through the structure of the networks. This does not mean that the transmission of flows is of no interest for this research, but that it is investigated as part of the operation of the networks, which was documented through interviews with members of the identified social networks.

Various types of social networks are described in the literature (e.g. one-mode, two-mode, and multiplex) (J. Scott, 2000), however only two are going to be discussed here: one-mode, and two-mode. This is it because the nature of the data collected for the construction of social networks was two-mode, while the analysis of social capital is done relying on one-mode networks (S. P. Borgatti, Jones, & Everett, 1998). While all networks in SNA show relational data between nodes, the difference between one-mode, and two-mode networks is that while one-mode networks are concerned with the ties between two sets of the same types of nodes (i.e. actor to actor); two-mode networks (also known as affiliation networks) consist in ties between two disjoint sets of entities (i.e. actor to event) (Faust, 2005; Latapy, Magnien, & Vecchio, 2008; Mote, 2005). The perspective used in this research, for both one and two-mode networks, is that of whole networks. Whole networks focus on the meta-characteristics of a network, by considering all nodes and links present in it, rather than on individual nodes and its surrounding alters (Everton, 2012; Marin & Wellman, 2011).

It is worth noting that network data, most of the times is collected in the form of one-mode networks (Marin & Wellman, 2011). However, this is not the case for the research at hand as data was collected as two-mode, because two-mode data collection

"is particularly useful in large networks where data collection by survey is prohibitively expensive" (Everett & Borgatti, 2005, p. 75). Also, in historic analysis, in which it is difficult to do direct observations and surveys, data is also collected through documents in form of two-mode data; as in the case of the classic work of A. Davis, Gardner, and Gardner (1941). Furthermore, in the particular case of this research, social networks were constructed relying on documents related to the embedded units of analysis utilised for this investigation, which is a two-mode data in origin. This is because the type of relational data collected was that of actors participating in embedded units of analysis, thus portraying the connections between two different sets of data, actors in the one hand, and embedded units of analysis on the other.

Even when data was originally collected as two-mode, it was then converted into one-mode networks (Marin & Wellman, 2011; M. E. J. Newman, 2001; Watts & Strogatz, 1998) relying on the UCINET (Stephen P Borgatti et al., 2002) dedicated algorithm. This was done because most of SNA's analytical metrics are developed for one-mode networks, which enabled the researcher of this thesis to enrich the analysis, as both two-mode and one-mode networks were analysed in parallel. The conversion of two-mode networks into their one-mode projections (one for actors, and the other for events) is done by assigning a tie between two actors if they participated in the same event together, while events are allocated with a connection if actors participated in more than one event (Latapy et al., 2008). Thus joint participation creates a social tie between actors, while events are tied to each other by their common participants (Faust, 2005). In the case of the networks here analysed, a tie is assigned when two actors appear in a document10 together.

Even when *"some data can be recorded either as 1-mode or 2-mode, at the convenience of the researcher"* (Stephen P. Borgatti & Everett, 1997, p. 244); carefulness is advised when transforming affiliation networks into one-mode ones, given that this implies a potential data loss (Everett & Borgatti, 2005; Latapy et al., 2008). For example, by converting two-mode data into one-mode, it would be impossible to know which actor attended which event (Stephen P. Borgatti & Everett, 1997). However, it is considered that existing metrics for two-mode networks are rather limited, particularly for identifying the different types of social capital, expected to be found in the social networks used for this research. Therefore, network transformation is used, despite data loss concerns. That being said, it does not mean that original affiliation data is of no use; rather, here both types of networks are analysed in tandem, as they are considered to be complementary to each other. Two-mode networks are particularly relevant for some research problems, particularly those of big networks and those trying to identify groups (Marin & Wellman, 2011); while one-mode networks are relevant to understand the characteristics of social structures.

10 Community petitions, meeting minutes, lists of participants, and government communications related to the embedded units of analysis (collective goals).

Data analysed in this thesis using SNA methods was originally collected in documents (e.g. community petitions, meeting minutes, lists of participants, and government communications) through archive mining. Given the nature of the analysed documents (relating community actors and collective goals as embedded units of analysis, as well as community actors and collective goals with dates of participation or occurrence), data was recorded as two-mode (i.e. actor to collective goal, and actor to date of participation). Two-mode networks were used to determine what actors were connected to each of the collective goals (i.e. embedded units of analysis), and also to determine what actors participated in each of the years investigated in this research.

Locating the sources of social capital and the importance of collective goals

Chapter 2 shows that social capital (SC) is a relevant concept to achieve urban resilience. SC is expressed through the outcomes of social networks' collective action, engaging in the achievement of their collective goals. It has been theorised that SC operates in three distinctive, but interdependent ways (Durlauf, 2002; Rydin & Holman, 2004): bonding, bridging, and linking. As explained in Chapter 2, the collective action required to achieve collective goals, is built relying on the interaction between bonding, bridging and linking social capital.

Furthermore, when it comes to the successfulness of social networks, it has also been discussed that not all social networks are capable of achieving collective goals. This is it because success depends on the structural characteristics of networks, in which a balance between diverse (heterogeneous) actors, and strong and weak ties is required to facilitate collective action (Bodin, Crona, & Ernstson, 2006; Everton, 2012; Granovetter, 1983; Sandström & Rova, 2009).

SNA is used to empirically understand the structure of the network that operated in the case-study at the moment of the struggle to meet collective goals, through the use of different metrics (described below). There is a metaphor behind each metric, from which the definition and properties of each type of social capital can be extrapolated. Selected measurements are divided in three, according to the modes of social networks, and these are subsequently divided in two explanatory perspectives: external (group), and internal (individual) (S. P. Borgatti et al., 1998).

One-mode networks: a whole network perspective

The first set of metrics are those relating with the overall structure of one-mode networks. The observation of whole networks, as discussed by Everton (2012), is useful to understand the general characteristics of the networks where individuals operate. From the whole network perspective, the metrics selected are: network density, network centralisation, bi-components (blocks), and homophily.

Network density refers to *"the proportion of pairs of alters that are connected"* (S. P. Borgatti et al., 1998, p. 30). That is, if all the individuals in a network are tied with each other, the density of the network will be one hundred percent. Density tends to decrease in function of the size of the network. Thus, larger networks present lower densities. In terms of SC, higher densities are expected to be present in networks of bonding social capital, and as such where strong ties are preponderant (Granovetter, 1973). Higher densities facilitate the velocity in which information is transmitted. In times of uncertainty, strong ties are more likely to provide sources of support. However, given that dense networks tend to have redundant ties between its members, the availability of new information is rather limited, which may hinder innovation (S. P. Borgatti et al., 1998; Everton, 2012).

Network centralisation refers to the degree in which a network relies on few individuals for its operation, and as such how power of individual actors are unequally distributed in the network (S. P. Borgatti et al., 1998; Hanneman & Riddle, 2005). Several types of network centralisation exist, one for each type of available centrality measure (degree, betweenness, closeness, and eigenvector), however here only two are considered relevant: degree and betweenness. Degree and betweenness centralisation are considered because those measures are the ones that share similar definitions to social capital, that is, networks with high degree centralisation share similarities to bonding networks; while high betweenness centralisation is an indicator of networks with high levels of either bridging or linking social capital (S. P. Borgatti et al., 1998).

Degree centrality is the number of alters (nodes) directly connected to a node, and *"degree centralisation of a network is the variation in the degrees of vertices divided by the maximum degree variation which is possible in a network of the same size."* (De Nooy, Mrvar, & Batagelj, 2011, p. 126) Betweenness centrality is a measure that depends on how many nodes a specific actor connects to as an intermediary. Thus, the vertex (i.e. actor) that connects the most nodes in a network would score the highest. Betweenness centralisation shows how concentrated is betweenness overall in the network (De Nooy et al., 2011). Degree centralisation is a measure *"sensitive to the local dominance of points, while a betweenness-based measure is rather more sensitive to the 'chaining' of points'."* (J. Scott, 2000, p. 83)

Everton (2012), and Newig, Günther, and Pahl-Wostl (2010) argue that decentralised networks perform better in handling complex problems as actors can react independently, without the necessity of a central figure to coordinate the network. However, too much decentralisation may difficult the mobilisation of resources as coordinating figures (central nodes) might be hard to reach. On the other hand, too centralised networks might suffer from the removal of central individuals as coordinating actors, and also might be too dependent on them, which might difficult an efficient operation in the face of complex situations (Janssen et al., 2006). From a resilience perspective, an effective

network, capable of mobilising collective action, should fall rather in the middle, being partly centralised and decentralised (Everton, 2012; L. Newman & Dale, 2005). This has been made explicit by L. Newman and Dale (2005, p. 2), while referring to Tompkins and Adger: *"A good mix of bonding and bridging networks will […] lead to greater resilience and an increased ability to adapt."* However, what a good balance of mix of centralisation constitutes an effective network is yet to be determined as literature suggest that it is a dynamic interplay of centralisations, and types of social capital what allow a network to be effective (Janssen et al., 2006; L. Newman & Dale, 2005).

Bi-components (blocks and cut points), is an algorithm that identify the sub-structures that are present in networks. This is done by locating 'weak' points that can decompose a network in smaller unconnected structures called blocks. Cut points are those nodes in a network that connect otherwise unconnected blocks. (Hanneman & Riddle, 2005). Bi-components, when looked with a SC lens, resonate with the meaning of bonding and bridging social capitals, offering the possibility of investigating the characteristics of a large network in SC terms. This is by identifying both denser independent blocks of bonding social capital, and the key actors that serve as bridges between them (Hanneman & Riddle, 2005). Cutting points are essential in facilitating the capacity of a network to innovate and increase access to other forms of capital, since dense unconnected blocks may constrain the ability of its members to innovate (Stephen P. Borgatti & Foster, 2003).

The latter idea also resonates with that of the strength of social ties, also relevant in both SC and SNA perspectives. In a seminal study about the importance of the strength of ties, Granovetter (1973) found that people were more likely to have more weak ties than strong ones, given that it is less costly to maintain weak ties than strong ones; and, more importantly, because weak ties tend to form bridges between otherwise disconnected dense clusters of people, thus allowing an efficient form of dissemination of resources (e.g. information, and influence). Therefore, actors with weak ties tend to have a wider and more diverse source of resources than those confined to what their strong ties can provide.

Finally, the measurement of homophily refers to *"the extent to which members of the group have their closest ties to members who are similar to themselves"* (S. P. Borgatti et al., 1998, p. 32). This measurement, applied to the resulting bi-components, helps in the research of bonding social capital, where members are expected to be integrated by people similar to each other (i.e. people sharing similar backgrounds, and resources). In this research, this similarity is based on the type of actor assigned to each node (e.g. Neza resident). Scoring high in this measure for the entire network would have negative effects in achieving resilience, since as noted by L. Newman and Dale (2005), high homophily imposes constraining social norms that discourage innovation. However on the other hand, parts of the network with high levels of homophily can facilitate coordination, the avoidance of conflict and the transmission of information (Stephen P. Borgatti & Foster,

2003). Homophily is measured estimating the proportion of existing ties in the network among similar nodes (i.e. ties between Neza residents). Homophily measures are a gradient between two extremes (1, and -1). Positive scores mean that the ties in the network occur predominantly between similar actors (homophily). Negative scores, mean that ties occur between actors that are different from each other (i.e. Neza residents, and government actors) (heterophily). (Hanneman & Riddle, 2005)

This subsection has discussed the metrics for one-mode networks used in this thesis. Relying on the metrics above mentioned (network density, network centralisation, bi-components, and homophily), it is expected to understand the general characteristics of the social network that participated in the case-study; which, when observed longitudinally, might provide the necessary elements to understand the structure of the network in the achievement of its collective goals.

Two-mode networks: Joint goals, and ranking collective goals

This subsection introduces the set of measurements applied to two-mode networks (two-mode degree centrality, two-mode betweenness centrality, and centralisation). The interest in two-mode networks in this research is twofold. First, to track the evolution of collective involvement in terms of the importance that each collective goal had over time (i.e. the predominance of a particular goal over time). Second, to understand how different events are connected to each other through their participants.

Degree centrality in two-mode networks has two main interpretations, according to the set of nodes being observed. If we consider degree centrality for an actor, then their centrality is the number of events they attend; for an event, the degree centrality would be the number of actors attending it. That is, *"the maximum degree of a node is given by the number of nodes in the opposing set"* (Stephen P. Borgatti & Everett, 1997, p. 254). By measuring two-mode centrality in this research, it is possible to show which events (embedded units of analysis) were the most active ones; allowing to deduce the ranking of importance that goal had for the community, and identifying the most active actors in the network in relation to that goal. In line with this, degree centrality may also provide evidence of what periods of the ones observed (1950s, 1960s, 1970s, and 1980s) were the most active ones; given that degree centrality may be interpreted as activity or popularity (Hawe, Webster, & Shiell, 2004, p. 974).

Two-mode betweenness is defined as *"the number of times that the shortest path between any two entities (groups or individuals) passes through the group"* (S. P. Borgatti et al., 1998, p. 33). This means that the betweenness of a node (actor or event), is a function of paths from actors to actors, actors to events, or events to events (Stephen P. Borgatti & Everett, 1997). According to S. P. Borgatti et al. (1998), events scoring high

in two-mode betweenness, have members who belong to groups that share few members, making exploitable weak links (structural holes). That is, to access novel information and resources beyond the reach of closed groups (R. S. Burt, 1992).

Centralisation, in two-mode data, provide two measures, one for actors and other for events. Potentially, this *"could measure to what extent the actors and events are centralized around a particular actor and to what extent actors and events are centered around a particular event"* (Stephen P. Borgatti & Everett, 1997, p. 260). This measure is useful in this research to understand if one actor (and collective goal) was more central than the others. Particularly from a longitudinal perspective this could shed light on the most relevant collective goals per decade.

Visualisation of networks

Probably one of the most appealing features of SNA, is that network data is stored in the form of matrices, which can be visualised in graphs, in form of sociograms. This creates powerful visual representations of networks, from which is easy to reach a few conclusions at a glance (Stephen P. Borgatti & Everett, 1997). However, this is only the case when nodes' distances between each other in a graph correspond to their theoretical position (J. Scott, 2000). That is, when the location of nodes provides a meaning about the relationships of the nodes, for example, nodes that share similar sets of ties should be located close to each other in a graph.

Therefore, visualisations used in this research are chosen because they provide meaningful sources of analysis. As such, the visual models are calculated with force directed algorithms11, *"such algorithms calculate the layout of a graph using only information contained within the structure of the graph"* (Kobourov, 2012, p. 1). Such method computes the geometry of a graph relying on two forces, simultaneously repulsive and attractive. Nodes are placed according to the theoretical distance between them. That is, nodes that exhibit shorter paths with each other are located proximately, while those that are theoretically far, are placed distant from each other. As such, this method allows an intuitive visual interpretation of a node's positionality. (L. C. Freeman, 2005; Kobourov, 2012)

The interest in visualising social networks in this research is threefold. The first one is to show how different types of SC are present in the structure of the social networks (one-mode data). The second is to unveil the interconnection between embedded units of analysis. And finally, to understand what periods of time were the most relevant in terms of collective action, through the community engagement in each one of the decades observed. In this sense, the purpose is to represent graphically the distinctive clusters of bonding SC, and the bridges among them. In the same vein, it is expected to find what

11 Other ways of referring to this graph layout are: multidimensional scaling, and smallest space analysis.

embedded units of analysis were pursuit by similar sets of actors (actors co-participating in more than one unit of analysis), which will be possible to understand from the distance between units of analysis (see: Stephen P. Borgatti & Everett, 1997). Thus, by using graph layouts where the position of nodes are placed according to the theoretical distances between them, it will be possible to uncover if there are in fact interesting patterns to be observed as discussed by L. C. Freeman (2005, p. 248): *"(1) those that reveal subsets of actors that are organized into cohesive social groups, and (2) those that reveal subsets of actors that occupy equivalent social positions, or roles"*.

Thematic analysis

Thematic analysis is a method that seeks the identification and analysis of patterns of meaning (themes) within qualitative data (Braun & Clarke, 2006). The purpose of the themes is to highlight the most relevant features within datasets that provide explanations to the phenomenon being researched (Joffe, 2011). According to Joffe (2011, p. 212), '[t]hematic analysis is best suited to elucidating the specific nature of a given group's conceptualisation of the phenomenon under study.' Thus, this method is appropriate to analyse the interviews collected for this thesis, as they account for social network participant's conceptualisations on the achievement of collective goals in Neza. Also, thematic analysis is an accessible, yet robust, method suitable for those in an early qualitative research career (Braun & Clarke, 2006).

The procedure followed to build the thematic analysis for this research was largely influenced by the methodological propositions of Braun and Clarke (2006). They propose a six-step procedure (Table 4) to make a robust thematic analysis. The six steps are: organising and familiarising with data, coding data, searching for themes, reviewing themes, naming themes, and writing the chapter. This procedure resulted in the analysis presented in Chapters 4, 5, and 7.

In general terms, thematic analysis is the grouping of relevant extracts of information found in the data (codes) into meaningful themes. According to Boyatzis (1998, p. 4), *"A theme is a pattern found in the information that at minimum describes and organizes the possible observations and at maximum interprets aspects of the phenomenon"*. The relevance of extracts is determined by their relation to the research question at hand. Themes and codes can be determined inductively or deductively. Inductive themes and codes are data driven, and as such are not influenced by pre-existing theories or the preconceptions of the researcher. Deductive themes and codes are determined by the theoretical perspectives taken for the research (e.g. social capital and urban resilience) (Braun & Clarke, 2006). For this research, a mixed approach is taken (Fereday & Muir-Cochrane, 2006). That is, the analysis of data was done considering the theoretical approaches of both social capital and urban resilience, while recognising existing patterns in the data

that helped to answer the research question. This approach was taken because during the process of familiarising with the data (see Table 4), it became clear that the richness of the data required to take a broader approach than that of the sole use of theory-driven themes.

Table 4. Thematic analysis step-by-ste*p*

Step	Process
1. Organising and familiarising with data.	• Data collection (semi-structure interviews). • Transcription of interviews. • Immersion in the data (reading the complete body of data). • Taking notes of initial codes and ideas.
2. Coding data.	• Code relevant extracts systematically across all the body of data. Extracts can be coded with as many codes as required.
3. Searching for themes	• Analyse codes and consider how they may be combined to form an overarching theme.
4. Reviewing themes	• Delete themes that not contain enough data or data is too diverse. • Coalesce or break down themes if necessary. • Clear distinctions between themes should be evident. • Themes should not try to cover too much or be diverse or complex.
5. Naming themes	• Find what narrative is present in the themes. • Name the themes according to its narrative in a way in which it provides immediate information of what the theme is about.
6. Writing the chapter	• Write-up requires providing evidence of the themes (i.e. enough extracts to demonstrate prevalence of the theme). • Extracts need to be embedded with an analysis narrative that compellingly illustrates the story. • Narrative should go beyond description and make an argument in relation with the research questions.

Source: Adapted from Braun and Clarke (2006)

The procedure

As previously stated, the procedure followed for the thematic analysis in this research is that of is the six steps method proposed by Braun and Clarke (2006): organising and familiarising with data, coding data, searching for themes, reviewing themes, naming themes, and writing the chapter. Despite being presented almost as a linear process, Braun's and Clarke's six steps are indeed an iterative process that entails going through the six steps in multiple occasions seeking for deeper familiarisation with the data, and further refinement of the analysis (Fereday & Muir-Cochrane, 2006). In this thesis, four iterations were conducted until analysis yielded sufficient insights to write a meaningful report (Chapters 4, 5, and 7). This procedure proved effective to gain relevant insights from the collected data in a meaningful and robust manner; the implementation of this method in this research is discussed in the following lines.

The first step of the method, familiarising with the data, was achieved incrementally during each of the iterations of the six steps considered in the method. Familiarisation with the data was initiated during the collection and transcription of interviews. 42 out of the 43 interviews analysed in this thesis (C-113 interview was taken from Benítez (1999)) were collected and transcribed by the researcher of this thesis. After transcribing all the interviews collected by the researcher, the entire body of data was read. During the transcription stage, and the first reading of all the interviews, notes were kept on emerging codes (Figure 4) prior to the first round of coding of data (step two). Further familiarisation with the data was achieved with each subsequent reading and coding rounds of the interview transcriptions.

The second step, coding data, is the result of four rounds of coding. The codes produced through the initial coding (during the familiarisation step) were used as a consistent list of codes to conduct an initial systematic coding of all the interviews. During each subsequent coding round, further codes emerged. A record of all emerging themes was kept, and these were used for the next coding rounds. The third step, searching for themes, entailed grouping codes into overarching categories (themes). This was done by finding the distinctive narratives present in interviews that help answer the research questions of the thesis. The fourth step, reviewing themes, was done by merging similar themes to each other, creating new ones when themes were too broad or complex, and by eliminating themes that did not contribute to answering the research questions of this thesis. Step four was also useful to refine the codes used to build themes (i.e. merging similar codes, and deleting those that were beyond the scope of the research). The resulting themes were then contrasted with the theoretical aspects of both social capital and resilience in the context of the case -study. The fifth step, naming themes, considered the distinctive information that each theme offered to the overarching narrative: a brief definition of each code and theme was also developed (see the final list of themes names and definitions in Table 5).12

The evolution of codes and themes is summarised in Figure 4, Figure 5, Figure 6, and Figure 7. As it is possible to observe, moving from one coding round to the following one entailed the refinement of the analysis, which resulted in fewer themes and codes in each subsequent coding round. However, fewer themes and codes in further coding rounds does not imply that previously coded data were of no interest for this research and for that reason was disregarded from the analysis. Rather than that, fewer codes and themes is the result of understanding that some themes and its codes could be coalesced as a code contributing to another, larger, theme. The refinement of subsequent coding rounds is explained in the following lines. The first round of coding (Figure 4) is a list of seventy-four independent codes (i.e. under no grouping themes), as these codes emerged as initial thoughts on the data set during the transcription and the first reading of interview

12 See Appendix 10 for a complete list of codes' and themes' definitions.

transcripts. Organising codes was done in subsequent coding rounds, in which a thematic grouping of codes was also conducted. The second coding round (Figure 5) resulted in fifty-six codes organised under nine themes. The third coding round (Figure 6) resulted in forty-one codes grouped in eight different themes. The final coding round (Figure 7) resulted in thirty-four codes grouped under seven proposed themes: framing challenges, group operation, goals, group formation, power, key moments, and social capital.

Table 5. *Definition of themes used in the thematic analysis*

Theme	Total contributing sources	Number of references	Description
Framing challenges	36	577	Interviewees' perspective on the challenges that Neza had to face to improve the settlement.
Goals	36	565	Set of collectively defined goals that contributed to the achievement of Neza's resilience.
Group formation	33	342	Strategies, procedures and drivers that helped the formation of Neza's social network.
Group operation	30	272	Distinctive mechanisms used for Neza's social networks to achieve collective goals.
Key moments	33	197	Defining moments that changed the trajectory of Neza's resilience.
Power	32	320	Control of the agendas that enabled or hindered the resilience of Neza.
Social capital	33	312	Rules of trust and reciprocity that are located in social networks and allow them to act collectively in pursue of various goals.

Source: Author's elaboration, partially based on Putnam (2000b); and Woolcock (1998).

Passing from nine to eight themes between the second and third round of coding is the result of merging all codes of PRI practices13, and then transforming the former PRI practices theme into a contributing code within the framing challenges theme in the third coding round. This was done because it was understood that all the codes under the PRI practices theme in the second coding round did not offer any space of a critical discussion as an independent theme. Instead, all the codes under the formerly PRI practices theme were part of a single code that could offer better opportunities of analysis as one of the challenges that social networks operating in the case-study had to face. Passing from

13 The PRI is the *Partido Revolucionario Institucional*, the unique party ruling Mexico between 1917 and 2000. This code refers to the political practices related to the operation of PRI as a unique party (clientelism, co-optation, corporatism, political exclusion). (See Appendix 10 for a full list of themes and codes descriptions.)

eight to seven themes between the third and fourth coding rounds was done by merging first settlers14 theme from the third coding round into that of group formation15 in the final coding round, as codes from the first settlers theme helped to explain the formation of groups in the case-study. However, instead of merely merging both codes (Oaxacans, and cosmopolitan city16) from the first settlers theme into a single code, codes were treated independently. First the code of Oaxacans17 was merged with that of role of ethnicity18 in the fourth coding round, as the information coded under both codes were indeed referring to the same sections of the data set. The code of cosmopolitan city was taken as contributor code of the group formation theme in the final coding round. After defining the final themes and codes, they are analysed and presented in Chapters 4, 5, and 7.

The sixth step, writing the chapter, was done incrementally, initiating after the first round of coding (through the use of a freewriting exercise). The aim was to organise the initial ideas that emerged from the first round of coding into a coherent narrative. This allowed the identification of the key elements driving the explanation of the phenomena. Further coding rounds supposed the revision of Chapters 4, 5, and 7, which in turn offered a more sophisticated understanding of the narrative and the requirements for subsequent coding rounds. Writing the chapter was only concluded after multiple revisions, after the last round of coding was finished. The result of the thematic analysis are Chapters 4, 5, and 7 of this research.

14 Defining characteristics of Neza's first settlers.

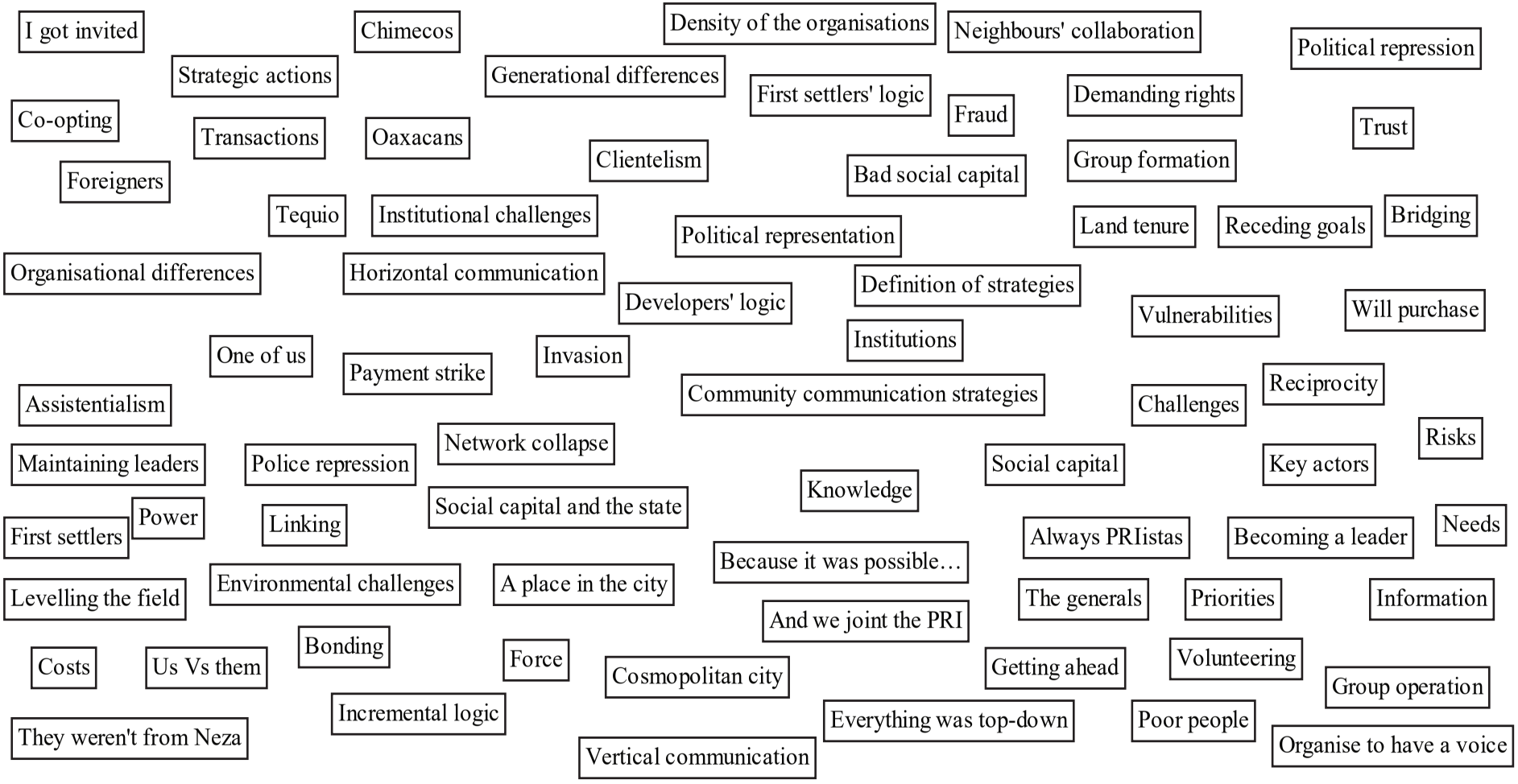
15 Strategies, procedures and drivers that helped the formation of Neza's social network.

16 Interviewees' account on the role of the diverse origin of Neza's early settlers as a basis for the formation of social networks.)

17 Oaxacans refer to the people from the Mexican southern State of Oaxaca.

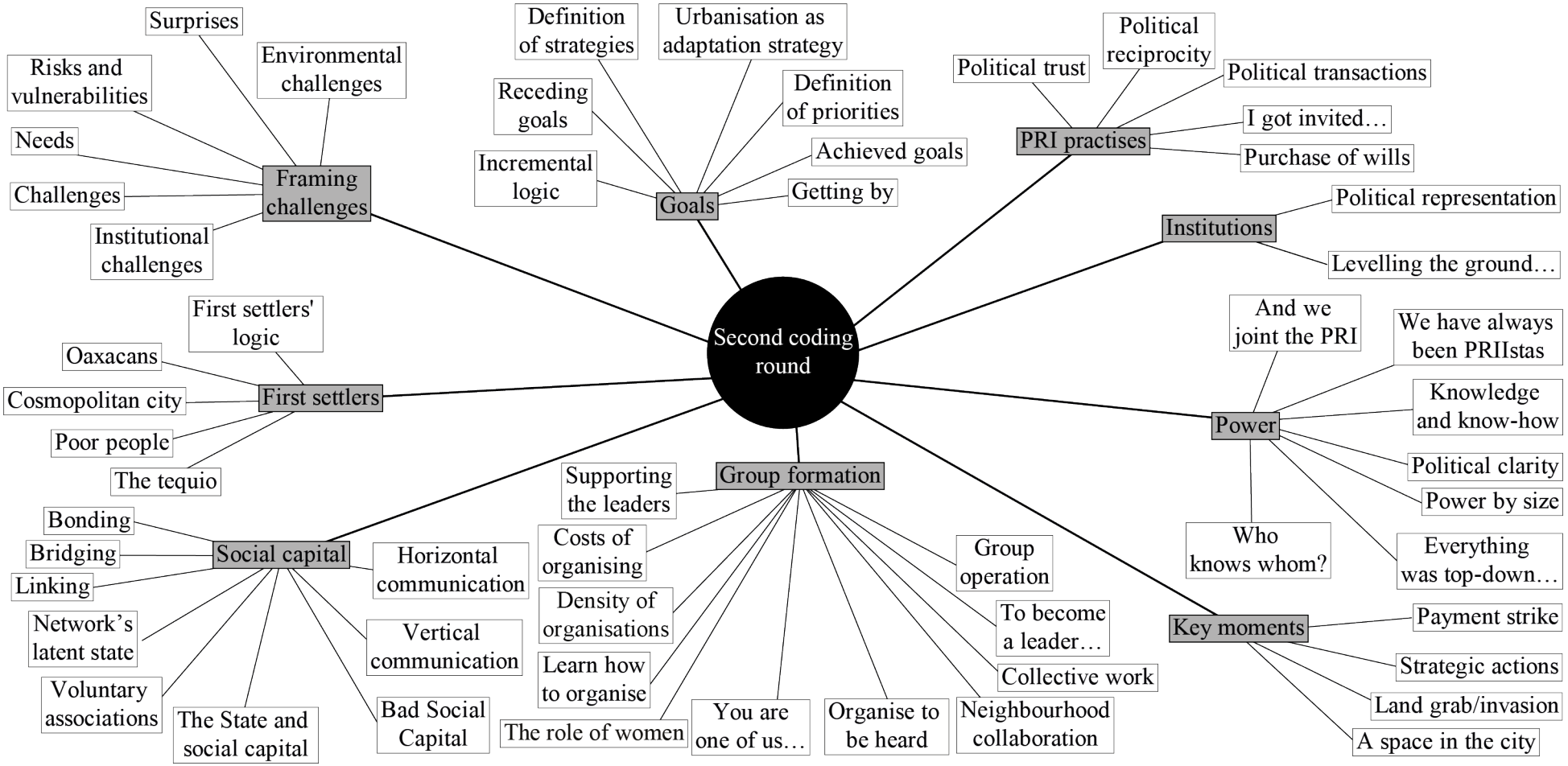
18 Interviewees' account on the role that the practices of Oaxacans as a distinctive ethnic group played in the formation of social networks.

Figure 4. *First round of coding*



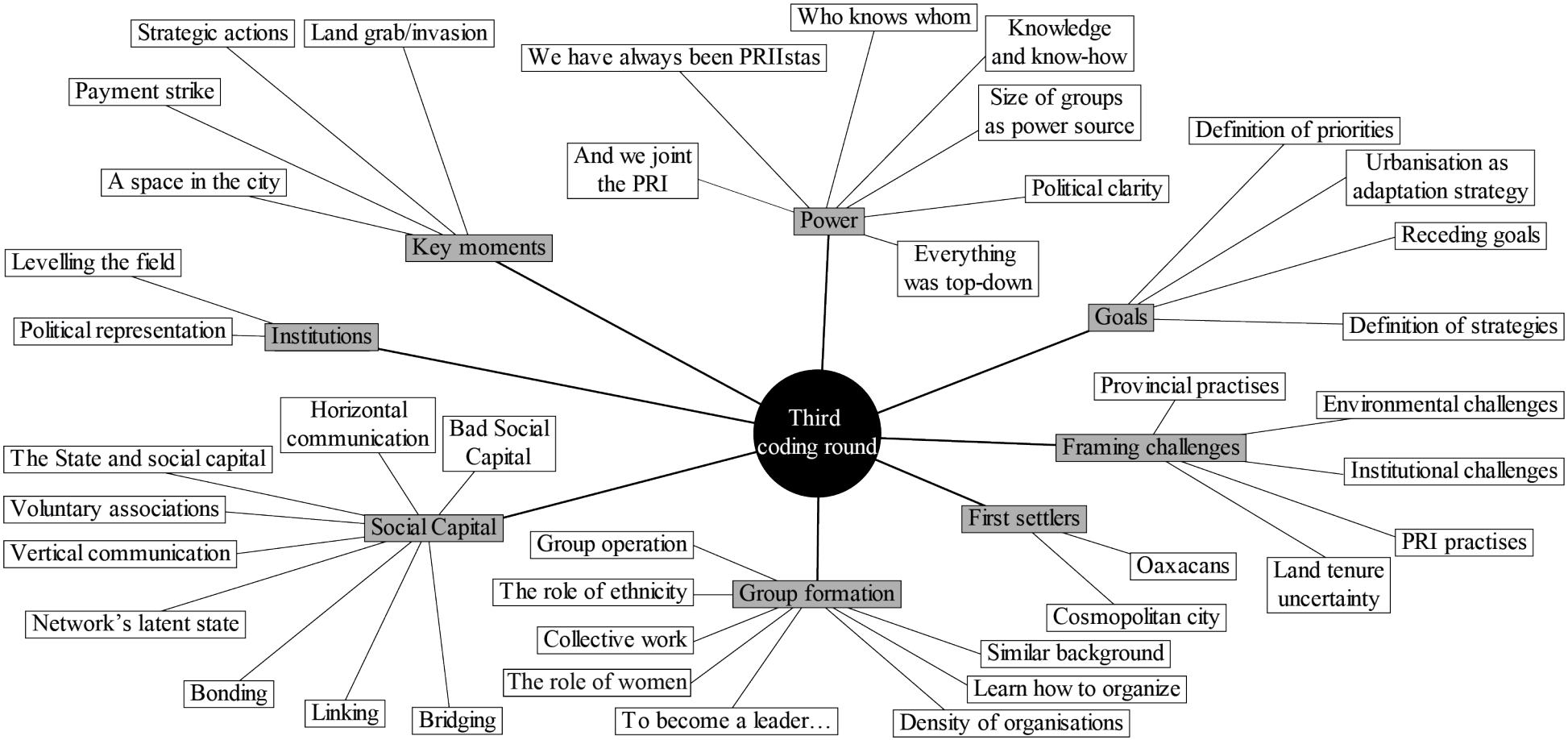
Source: Author's elaboration.

Figure 5. *Second round of coding*



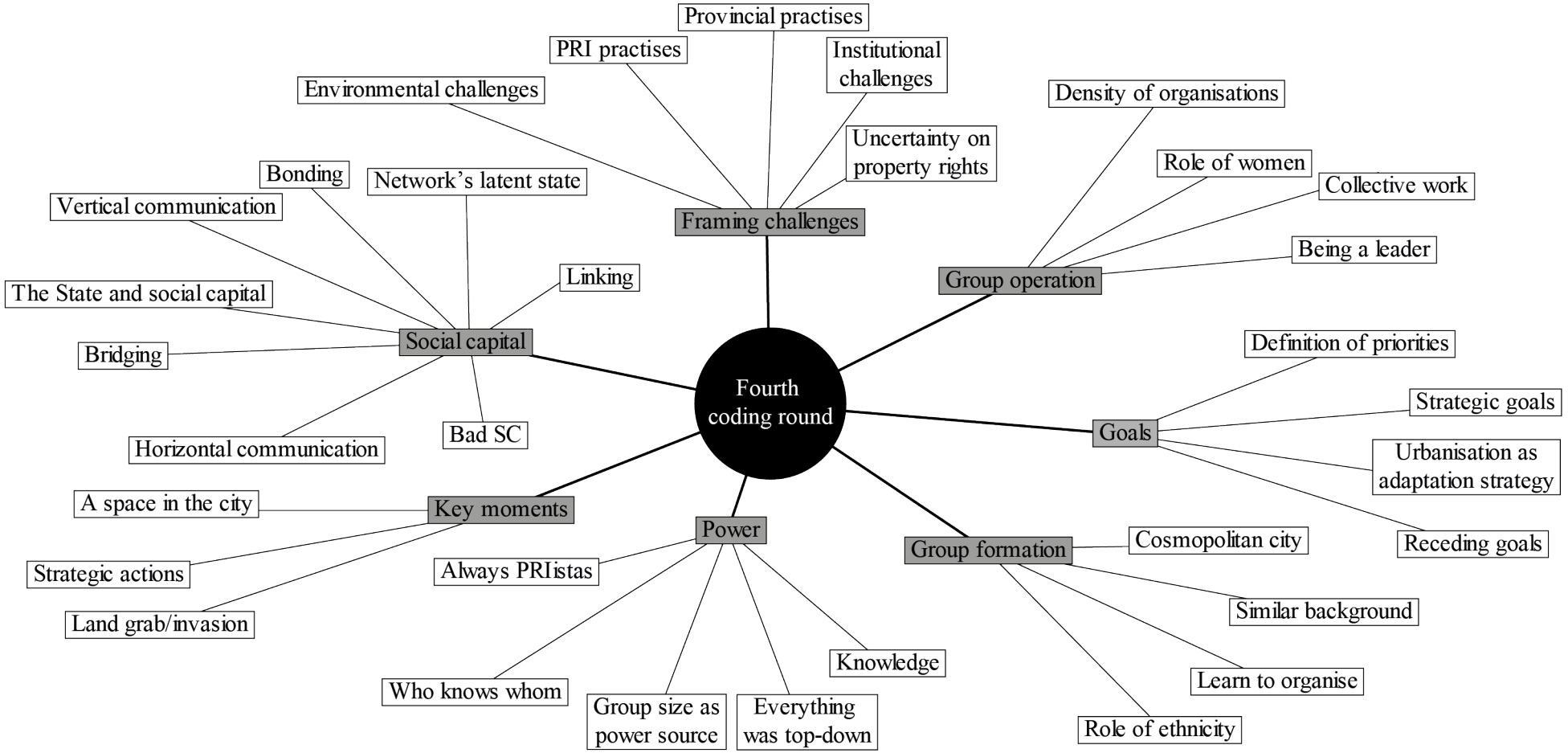
Source: Author's elaboration.

Figure 6. *Third round of coding*



Source: Author's elaboration.

Figure 7. *Fourth round of coding*



Source: Author's elaboration.

Limitations of this methodology

Every research method has its limitations, and few studies are conducted exactly as planned (Yin, 2009). Therefore, it is necessary to acknowledge the main limitations that the methodology used for this research presented, and the mitigation strategies followed to overcome them. Limitations spanned across the different stages of this research (Figure 1 in page 58): desk-based (definition of research strategy), fieldwork (data collection and initial SNA), and coming back from fieldwork (SNA, transcription and thematic analysis of interviews, and writing-up). The main limitations of this investigation were recognised at the desk-based stage and a mitigation strategy was developed accordingly. Method limitations were related to the challenges that conducting a mixed-method research entailed in each of the stages of the strategy used for this research.

As previously discussed at the beginning of this chapter (Section 3.1), conducting research using a mixed-method strategy can be challenging at multiple levels. First, it can be time consuming as using more than one method, two in the case of this research (SNA, and thematic analysis), presumes collecting two sets of data, as well as using two different analytical procedures. This entails the understanding of the strengths and weaknesses of both methods, as well as the opportunities of complementarity between both methods. To address the issue of having enough time to conduct this research as planned, it was initially estimated that six months were going to be necessary to collect empirical data in the field. This initial estimation was not enough to collect sufficient data, and fieldwork was then extended for two extra months as archive mining and locating interviewees proved more difficult than estimated. Encountered difficulties during fieldwork, particularly during data collection, spanned from the organisation of municipal archives –or lack thereof–, difficulty in accessing suitable interviewees, to those related to the longitudinal nature of this research. Encountered limitations during the fieldwork stage are summarised in Table 6.

The first limitation, organisation of archives, is related to the availability of relevant information. Relevant documents were only found in one of the municipal archives, which is dedicated to preserving historic documents of Nezahualcóyotl municipality (CIDNE). Thus, archives preserved there could potentially relate a particular account of events that State's power is interested in promoting according to particular agendas. Although numerous archives existed, relevant documents were only found in one of the municipal archives, which is dedicated to preserve historic documents of Nezahualcóyotl municipality (CIDNE). This archive was created in the decade of the 1980s by the State's government. According to the librarian of CIDNE, with whom the researcher informally conversed in multiple moments during the archive stage of the investigation, documents that are preserved there were first catalogued and curated by the State's archives office. Also, the librarian recognises that some of the documents that were originally part of the catalogue had been stolen by previous librarians, although what documents had dis-

appeared from the archive remains unknown. This could indicate that the information maintained in the archive had been modified according to particular agendas. Therefore, the data collected in that archive might be somehow biased.

Table 6. *Fieldwork limitations*

Research sub-question	Data collection method	Expected outcomes	Limitations
What network structure supports the operation of social capital for the resilience of self-help settlements?	Archives and documents. Semi-structured Interviews.	Definition of embedded units of analysis.	Participants do not keep a record of reliable community actors, or refuse to share the information. Archives do not exist, have been destroyed.
	Semi-structured Interviews. Archives and documents.	Identification of networks and community leaders and civil servants.	Participants decline being interviewed. Insufficient number of participants. Archives do not exist, have been destroyed.
How do networks of social capital operate for the resilience of self-help settlements?	Semi-structured interviews.	Understanding of how people worked with others in Neza to achieve urban resilience. Exploration of the capacity of actors, groups and networks to achieve urban resilience.	Participants decline being interviewed. Insufficient number of participants.

Source: Author's elaboration

The second limitation found in the CIDNE archive is that of the organisation of documents. Even when the archive was originally prepared by professional librarians, in its 30-year history, the archive suffered from the negligence of some of the municipal administrations, which according to the librarian had appointed unfit personnel to the archive, resulting not only in the physical loss of some documents, but to the continuous disorganisation of them. The result of this, was that all the research documents reviewed for this research, were contained in boxes without a proper cataloguing system, the only cataloguing system were broad categories such as 'public works'. This required the individual processing of every document in those boxes to select the relevant documents that informed this research.

Limitations were also encountered in the possibility of accessing relevant interview sources. Given that the methodology required that interview participants had to be part of Neza's social network, this limited the universe of potential interviewees, whom in most cases were difficult to locate. And furthermore, the longitudinal nature of this research (thirty-three years of social network activities) made the snow-ball sampling process even more difficult, as interviewees in several cases had lost contact with members of the network. In other occasions, interviewees remembered the names of network participants from the list prepared in the archive mining stage, but they recognised them as having passed away. In addition to this, interviewees participating at early stages of Neza's collective action were fewer, limiting the amount of information collected (this is particularly relevant for the analysis of the collective goal of municipal independence). Other difficulties in accessing interviewees, is that of public servants. This is because Mexico has a governmental culture of high rotation of public servants, who rotate every three years in accordance with municipal office terms (OECD, 2013), and given the longitudinal analysis that this research proposes, the possibilities of locating civil servants involved in the collective goals of Neza's development were rather scarce.

The limitations encountered during the fieldwork stage of this research were mitigated as follows. Archive limitations were tackled by using the information collected in interviews to triangulate findings. Difficulties in accessing network participants to integrate a robust sample size of interviewees was solved by widening the universe of participants to consider members of the network who were identified by other members of the network. In addition, multiple strategies were used to locate potential interviewees (snow-ball sampling, post, and telephone) (see subsection 3.2 in this chapter); this allowed the researcher to reach a robust sample of interview sources.

Limitations were also present during the analysis of the data collected on the field. It is important to recall that data preparation and analysis was conducted both during fieldwork and coming back from fieldwork; nevertheless, limitations in this regard refer to those that SNA and thematic analysis imposed in the context of this research. In terms of the limitations of SNA, four main limitations were encountered: the difficulty of establishing the limits of the analysed social network, the analytical possibilities of the method related to the operation of the social network, the use of SNA metrics in social capital, and a general limitation on the possibility to generalise and compare social network data with other networks. Regarding the limitations of use of thematic analysis in this thesis, the main concern is proving that interview data interpretations were made in a rigorous and credible way.

The first limitation of SNA in the context of this research is related to the configuration of the social network analysed. As it has been discussed in section 3.4 in this chapter, the limits of the social network (size and members of the network) analysed in this research were defined by the participation of actors in the public records (e.g. commu-

nity petitions, meeting minutes, lists of participants, and government communications) directly related with the embedded units of analysis of this research. That is, the social network used in the SNA of this research only considers participants whose names were found in public documents preserved in the CIDNE archive. This is the main limitation of this method because the size of the actual network of the case-study may differ from the analysed one, as network participation of other actors may have occurred without leaving record of it in the public archive investigated. It was initially considered that a possible mitigation strategy to obtain a more accurate social network was to ask interviewees to identify missing actors from the list of network participants collected through archive mining. This proved to be futile as most interviewees only remembered few other network participants, but were unable to remember what specific collective goals (embedded units of analysis) they participated in. Thus, it was not possible to include additional actors identified by interview sources to the social network, as this information did not meet the standards of the rest of network participants identified during archive mining. Nevertheless, it is considered that the network used for the SNA is a meaningful sample, considering the availability of reliable and verifiable evidence of actors' network participation.

The second limitation in the use of SNA is related to its analytical possibilities. SNA is an effective way to understand the structure of social networks, meaning the patterns of links between the data (actors and collective goals) in all its combinations (e.g. actors by actors, and actors by collective goals), the importance of actors and collective goals (centrality), and the identification of types of social capital (bi-components). However, SNA is limited in shedding light on the operation of the network (e.g. the social rules of trust of reciprocity among network members). This limitation was acknowledged from the beginning of the research, and for this reason a mixed-method approach was considered (Woolcock & Narayan, 2000), as network operation could be better explained relying on qualitative methods (thematic analysis).

The third limitation in the use of SNA is the difficulty of comparing results from SNA metrics of one network with others. This is because, as put by Bodin and Crona (2009), and L. Newman and Dale (2005), not all social networks are created equal. That is to say the specific contexts, objectives, and dynamics in which different social networks emerge are unique. Thus, information derived from the analysis of different social networks is not necessarily comparable to each other. For this reason, SNA tend to focus on single case-studies (Everton, 2012), which is what is done in this research.

The fourth and final limitation of SNA in this research is the availability of specific metrics developed for the study of different types of social capital. The study of social capital has been related to social networks (DeFilippis, 2001), however, SNA scholarship is limited in providing specific metrics to study social capital, as most sources focus on a single type of social capital (bonding social capital) (S. P. Borgatti et al., 1998; Ronald S. Burt, 2000; Ronald S Burt, 2002; Gargiulo & Benassi, 2000). Studies looking beyond

bonding social capital tend to stress the need of social networks to exploit missing links in the network as opportunities to access novel resources beyond existing links (R. S. Burt, 1992). This limitation was tackled in this research by looking into the meaning of existing SNA metrics and comparing it with the meaning of different types of social capital. This led to the identification of different measurements to locate different types of social capital (e.g. network density, centrality measures, and bi-components) (see section 3.4).

With regards to the limitations in the use of thematic analysis for this research, one concern was at the forefront: proving that the interpretation of interview data is rigorous and reliable. In this sense, the main challenge was to acknowledge that the analysis, as in any other qualitative method, was highly influenced by the personal perspectives of the researcher; which in turn is reflected in the coding frame used for the interpretation of interview data. A strategy that is being proposed by Joffe (2011) to tackle this issue is to test the coding frame by two independent researchers. However, given the individual nature of a doctoral research, this was not entirely possible to do, which might constitute a limitation of the use of this method in the context of this investigation. A mitigation strategy for this issue was to discuss collected interview data and its analysis with both thesis supervisors. Also, in order to make transparent the progression in the definition of codes and themes, all four coding rounds of analysis are presented above (see Figure 4, Figure 5, Figure 6, and Figure 7). To enhance the robustness of the analysis, four iterations of process proposed by Braun and Clarke (2006) were applied to the entire corpus of interview data interpreted for this research.

In conclusion, given that this investigation was conducted following a mixed research strategy, the limitations of one methodology were effectively mitigated by the strengths of the other across all the stages of this research. On the one hand, data collected through archive mining (systematised using both quantitative and qualitative methods) helped to gather information to understand the structure of the social network of the case study, information that would have been nearly impossible to collect in a robust and systematic manner following solely qualitative or quantitative methods. On the other hand, understanding the operation of the case-study's social network was facilitated by interview data interpreted using thematic analysis. In sum, the combination of methods helped the researcher to collect and analyse relevant data; while the acknowledgement of methods' limitations, and the development of appropriate mitigation strategies served to conduct this research in a rigorous and robust way.

3.5 Positionality statement

There is a growing interest in qualitative research to acknowledge that the process of knowledge creation is highly influenced by the social position of the researcher (e.g. gender, class, national identity) (Berger, 2015; Crossa, 2012; England, 1994; Jacobs-Huey, 2002; Sultana, 2007), and that it is necessary for researchers to be aware of how

their positionality may influence the development of their investigation (Rowe, 2014). Furthermore, *"[r]esearchers are increasingly expected to account for how their own positionalities and ways of asking, seeing/interpreting, and speaking influence their production of "partial"* representations of their engagements in the field" (Jacobs-Huey, 2002, p. 791). In this section the positionality of the researcher of this thesis is offered using a personal voice. In the following lines, I reflect on how my social position (ethnic background, social class, and political orientation) influenced the development of my research from the selection of self-help settlement to describe Neza, to the processes of data collection on the field, analysis and reporting results. To address these matters, this section is divided in two parts. First, I discuss my social positionality in terms of my ethnicity, social class, and political orientation. Then, I address how my positionality affected the development of this investigation.

Mexico is a country in which most of the population has a mixed ethnic origin with a predominant indigenous heritage. More than 60% of the population in Mexico identifies themselves as being moreno (dark brown skin colour) (INEGI, 2016a). Although most of the population in Mexico is Moreno and has a mixed background, there is a strong correlation between the skin colour of individuals and their social class (INEGI, 2016a). Historically, wealth and power in Mexico has been concentrated by lighter skin Mexicans, in a continuum in which white Mexicans (descendants of Spanish colonisers) occupy the top of social strata, followed by mestizos (mixed Mexican indigenous with Spanish colonisers), and at the bottom of the social class ladder are Mexican indigenous (Crossa, 2012; Flores & Telles, 2012; Nutini, 1997). Thus, the colour of the skin of people in Mexico is an important determinant of the kind and quality of the opportunities someone may encounter in life (INEGI, 2016a), such as the context in which someone may end up inhabiting. Wealthy areas tend to be populated by predominantly white Mexicans. Disadvantaged areas tend to be inhabited by mestizos and Mexican indigenous people. Neza, the case of my investigation, is a municipality that at its origins was highly marginalised, and as previously explained, social classes and ethnic origins are highly correlated in Mexico. In Neza, the population is mostly mestiza, coexisting with an important indigenous population.

I am a mestizo with a strong indigenous heritage, also I identify myself as being moreno. Additionally, I am Mexican from Mexico City, researching a municipality that is part of my hometown, and my mother tongue is Spanish (as it is for more than 98% of Neza residents) (INEGI, 2010b). Thus, from an ethnic and cultural standpoint, I can see myself perfectly fitting the context of my research. Therefore, at the beginning of this investigation, I was certain that that my social position in the context of my research was that of an 'insider' (Merriam et al., 2001), and as such I thought that my personal biases could not affect the outcome of my investigation. Nevertheless, as Sultana (2007) explains, being a researcher from the Global South does not mean that there is no difference between the researcher and participants, as class and educational differences may still be

present. In my case, I come from a rather different context than that of Neza, which has strongly shaped the way I understand the world. I grew-up in a middle-class municipality, which according to the United Nations Human Development Index (HDI), has a development level comparable to that of the Netherlands. In contrast, Neza's HDI is comparable to that of Algeria (UNDP, 2014). Despite development differences between the context I grew up in and that of Neza; I believe that the most striking difference between my positionality and that of the interview participants of this research is my left-wing political orientation. In my upbringing I was educated to be highly critical of the Mexican political regime19 and its practices, which in my understanding are highly undemocratic, corrupt, and are the source of Mexico's state of social exclusion and despair. Thus, from my perspective, the origins of Neza as a highly marginalised settlement, are a direct consequence of the very actions of the regime I was educated to reject. In contrast to my personal opinion, Neza residents tend to find the PRI party and its practices to be part of the reason for Neza's improvement.

My positionality as identifying myself ethnically and culturally fitting the context of my research, and my political orientation influenced the way I conducted this research in two main ways: the selection of words to frame my research, and the process of collecting, analysing, and reporting empirical data. First, my ethnic and cultural background made me aware of the negative meaning that terminologies often used in academia to describe settlements like Neza (e.g. shanty town, informal settlement, illegal settlement, or slum) carry. I believe that words matter. In this sense, I think that calling a settlement either shanty town, informal settlement, illegal settlement, or slum carries a pejorative meaning that disenfranchises people living in such areas (Gilbert, 2007). Furthermore, the use of these words to describe already marginalised urban settlements seem to have been at the service of powerful elites to forward public policies oriented to eradicate such areas, as those words serve the purpose of emphasising the state of marginalised communities as unsanitary, illegal, or examples of everything that is wrong with decent urban living (Gilbert, 2007). The fact that I perfectly see myself fitting the context of my research made me particularly aware of the responsibility that I have as a researcher towards the interview informants of my investigation, and even to myself. Thus, I chose not to use a terminology that I perceive as pejorative.

The second way my positionality influenced the development of my research is through my left-wing political orientation, and my critical perspective on the practices of the PRI party. In contrast to my political standpoint, many of the Neza residents I interviewed for this research see the PRI party, its governing methods, and some of its main characters as being key for the achievement of the very collective goals I investigate in this thesis. Thus, my opinion is in conflict with that of many of the people I interviewed for this research in relation to the PRI party. In many occasions, tensions between my

19 Mexico has been governed almost exclusively by the PRI party since the 1920s.

personal beliefs and the opinions of the people I interviewed during my research caused me discomfort while collecting interview data and made me frown while transcribing and analysing it. In such occasions, my first impulse was to disregard and silence those interview excerpts portraying in good terms the PRI party, the political figures that I grew up identifying as incarnating all the evils of the regime, and the political practices I consider to be at the root of Mexico's state of social despair. However, as put by Falconer Al-Hindi and Kawabata (2002, p. 114) cited by Sultana (2007, p. 376): *"Writing about research conducted in the more fully reflexive mode… requires that the researcher identify and locate herself, not just in the research, but also in the writing. She must be willing to write and so relive discomforting experiences, to look awkward and feel ill at ease. She must commit to paper and thus to the scrutiny of peers and others that which she might prefer to forget."*

During fieldwork, I always managed to conduct interviews following the interview guide I had prepared, regardless of the discomfort the answers caused me. However, part of my interview process considered asking interviewees to nominate further potential interviewees, and it took great effort to keep contacting such persons nominated by interviewees referring the PRI party and its practices in good terms, as I knew those interview candidates most likely would emphasise PRI supporters claims. Nevertheless, by reflecting on my personal biases I understood that even when I disagreed with my interviewees, I had to be respectful of their opinions and keep contacting their interview nominees. Similarly, during the transcription and analysis of interviews I had to fight against myself to transcribe interview data verbatim, and it took many rounds of coding to acknowledge as relevant the information depicting the PRI party, its political figures and its institutional practices as relevant for the achievement of the collective goals of Neza residents. By taking a reflexive approach on my positionality, I managed to approach interview data more openly, and to translate the opinions of the participants of this research more respectfully, despite my political position (See England, 1994 and Jacobs-Huey, 2002 for a similar stance).

In sum, my positionality as a middle-class-left-wing moreno person shaped my research in two different ways. First, I choose the term self-help settlement to define the typology of Neza's urbanisation, as I consider it more respectful towards Neza inhabitants than the alternatives (e.g. informal settlement). Second, my political inclinations made me, on the one hand, recognise the political actors and practices within the data collected in the field that made me uncomfortable. On the other hand, discomfort towards empirical data, in tandem with the process of being constantly challenging my instincts of silencing data I disagreed with, made me acknowledge my personal biases and provide a more faithful report of the interview data I collected in the field.

3.6 Concluding remarks

This chapter has set out the methodology used in this research. It has shown the relevance of studying the role of social capital in the resilience of self-help settlements in context, as social capital can be better understood in real-life situations. Therefore, a case-study approach with embedded units of analysis is proposed for the design of this research. On the one hand, the case-study provides a real-life context in which social capital can be identified, and on the other, six outcomes of civic engagement (municipal independence, land tenure rights, water supply, drainage, public transport, and paved streets) that contribute to the resilience of Neza, are used as embedded units of analysis. Building on Chapter 2, which discussed that social capital has two dimensions: structure, and operation; this chapter considers that an appropriate design to understand both dimensions of social capital is a mixed-method approach. In this sense, the structure of social capital is researched using the quantitative methods of Social Network Analysis; while its operation is investigated using interview data, analysed qualitatively. This chapter also addresses issues of complementarity of the methods used. It was stressed that the weaknesses of one method has to be overcome by the strengths of the other. In this sense, the complementarity of SNA and thematic analysis is based on the contribution that each method provides to understating both dimensions of social capital. Understanding both dimensions of social capital is necessary to produce robust and credible findings. Having described the research process, the following chapter analyses the contextual factors of the case-study to set the scene for this research.

4. Setting the scene: Nezahualcóyotl as case study

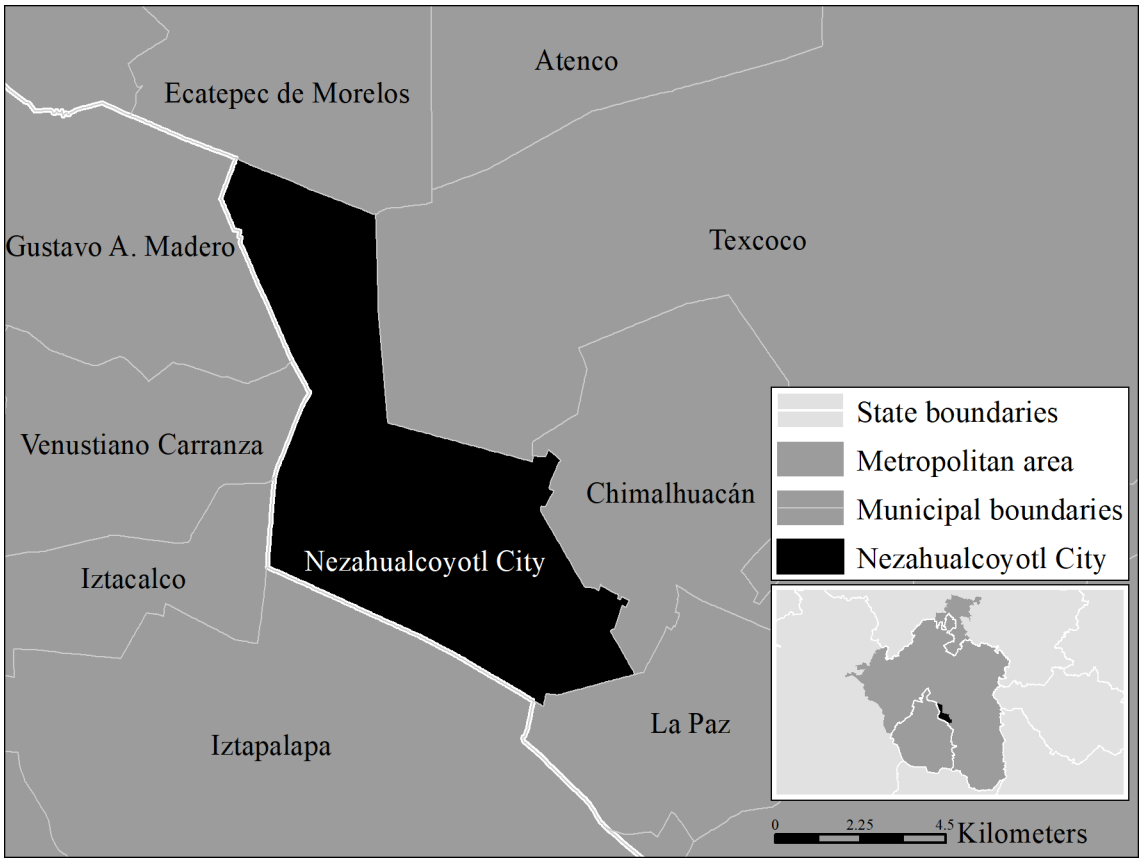
The objective of this chapter is to introduce Nezahualcóyotl or Neza in short, as the setting for this research. This chapter achieves two objectives. First, it presents the historic, socio-economic, and environmental challenges in which Neza urbanised. Second, it justifies the selection of Neza as the case-study, as it demonstrates that the solution to the challenges faced in Neza were forwarded by the civic engagement of its residents. Together, both outcomes of the chapter provide the necessary context to undertake the analysis of the following chapters. The chapter is divided in three main sections. Section 4.1 discusses the existing literature that addresses the historical process of Neza's urbanisation. This discussion originally informed the selection of Neza as case-study; which was briefly addressed along with the rationale that determined the selection of the case in the previous chapter (Chapter 3). The second part (section 4.2) explores the environmental and institutional challenges to Neza's urbanisation as perceived by the participants in Neza's social network (uncovered through the analysis of interviews). The third part of this chapter (section 4.3) discusses the outcomes of community engagement in tackling Neza's challenges (based on academic evidence).

Neza, is a municipality that is part of Mexico City's Metropolitan Area, which spans across seventy six municipalities in three states (see Figure 2 in page 60): Mexico City, State of Mexico, and Hidalgo State (SEDESOL et al., 2010). Given the particularities of Mexican federalism, the municipalities that form part of the Metropolitan Area of Mexico City operate independently to each other; thus, the metropolitan area is not recognised as an administrative unit (Iracheta Cenecorta, 2003). The Metropolitan Area of Mexico City is considered to be one of the largest cities in the world, with an estimated population of 20.1 million inhabitants in 2010 (INEGI, 2010b). Greater London, in comparison, spans across 33 boroughs and had an estimated population of 12.9 million inhabitants in 2010 (ONS, 2015). Neza is located 12 kilometres east from the centre of Mexico City, at the border between Mexico City and the State of Mexico, on the side of the State of Mexico. Neza shares a border with nine other municipalities (Figure 8 in page 96). In 2010, Neza had a population of 1.1 million inhabitants and an area of 63 km2, which represents 5.5% of the population of Mexico City Metropolitan Area, and 0.8% of its territory (INEGI, 2010b; SEDESOL et al., 2010).

Neza is the result of the intricate relation of multiple factors -environmental, political, and economic- operating at different scales, both spatially and historically, that have defined the urbanisation of Mexico City. This urbanisation has been largely dominated by self-help settlements, that today account for more than 60% of Mexico City's urban structure (García Peralta, 2013). Neza emerged as many other self-help settlements do: a group of poor rural migrants with no access to formal urban land settle in an undesirable

piece of land, incrementally self-constructs a new neighbourhood, facing several hazards ranging from government evictions to unsanitary conditions and environmental disasters (Rodgers, Beall, & Kanbur, 2011).

Figure 8. *Nezahualcóyotl and neighbouring municipalities*



Source: Author's elaboration, using cartographic information from: INEGI (2010a)

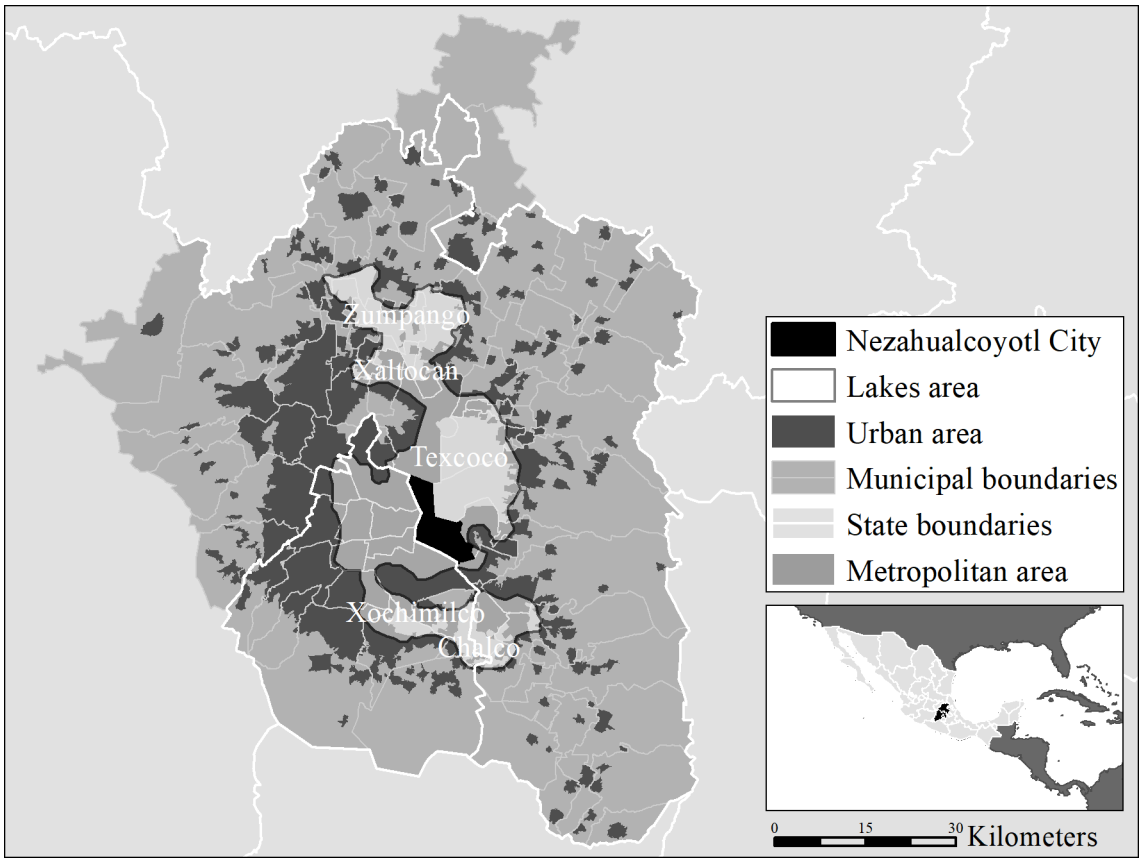
Neza is probably one of the most emblematic and fascinating examples of self-help urbanisation in Mexico (Castillo, 2001). This settlement started its construction early in the decade of the 1950s, with an initial population of nearly 2,000, which rapidly grew to reach more than one million inhabitants in 2010. From being *"symbol of everything that plagued the city: pollution, environmental decay, and uncontrolled growth"* (Castillo, 2001, p. 107), Neza quickly became a fully recognised municipality in 1963, with a vibrant economy (UN-Habitat, 2003). *"In a generation, Neza's inhabitants had gone from desperately poor to respectably working class"* (Selee, 2011, p. 131).

Four factors have marked Neza's evolution: the environmentally challenging location of Mexico City, the historic transformations that the city has undertaken since its foundation to cope with the environment, the unintended consequences of national economic policies and local planning measures, and the ability of Neza's residents to cope with adversity in the construction of their city. The following sections discuss these factors in turn.

4.1 Mexico City and its process of urbanisation: The context of Neza's formation

Mexico City is located in the central high plateaus of Mexico, at an altitude of 2,250 metres above sea level, in the Valley of Mexico. The Valley of Mexico is surrounded by a 4,000 metre-high mountain chain (Romero Lankao, 2010), that creates an endorheic20 basin which used to have a five-lakes system within it: Texcoco, Zumpango, Xochimilco, Xaltocan, and Chalco lakes (see Figure 9). The lakes had no natural surface outflow, which means that during rain seasons the lakes often joined, forming a single body of water. Furthermore, the water of the lakes were not suitable for human use, since Texcoco, Zumpango and Xaltocan lakes were salty, and although Xochimilco and Chalco lakes had fresh water, the constant combination of the lakes made it unsuitable for human use (Perló Cohen & González Reynoso, 2006). 21

Figure 9. *Former Lakes Area*



Source: Author's elaboration, using cartographic information from: INEGI (2010a), SEDESOL et al. (2010), and REPSA-UNAM (2013)

20 "Endorheic regions are considered closed systems because, rather than draining to the sea, surface waters drain to inland termini whence they evaporate or seep away." (Encyclopædia Britannica, 2015)

21 An early management strategy of the lakes' water implemented by the Aztecs in 1449 was the construction of a dike that prevented the lakes to merge, effectively separating salty and fresh water. This enabled flooding regulation, and allowed agriculture. The dike was destroyed after the Spanish colonisation of Mexico. (Perló Cohen and González Reynoso, 2006)

This rather challenging location means that the existence of the city has always been defined by its relation with the lakes, from their early management and coexistence, to their later drainage and urbanisation, and the perpetual flooding risk that having a 20 million inhabitants city in a naturally flooding area implies (Romero Lankao, 2010).22 In sum, Mexico City's urbanisation has always been closely related to a process of transformation and adaptation to its particular environment.

Historically, seasonal flooding has been the main challenge for the expansion of the city, and the principal source of urban concern and intervention. Soon after the foundation of the Spanish city in 1535, the draining process of the lakes started to prevent seasonal flooding. As the lakes retreated, the city expanded. (Perló Cohen & González Reynoso, 2006). Flood-preventing drainage works started thirty years after the conquest of Tenochtitlan23 in 1550, and ended at the beginning of the twentieth century with the expansion of the modern draining system (Palma Galván, 2007; Perló Cohen & González Reynoso, 2006; Romero Lankao, 2010).24

The process of the drainage of the lakes historically occurred from its shallower parts in the west to the deeper side in the east. Since the Spanish conquest, the best parts of the valley (west part) were used by the better-off sectors of society, first defined by race, and more recently by income (Sánchez Almanza, 2004). This means that as some areas of the city were environmentally improved, these were occupied by the wealthier sectors of the society, while the risky flooding-prone areas were left to the urban poor.

The drainage of the last remnants of Texcoco Lake (where Neza now stands) at the beginning of the twentieth century was the final stage of the flood protection strategy of Mexico City. The land gained after Texcoco Lake was drained left a barren desert and produced an unexpected effect: dust storms in the rest of the city in dry seasons, generating a new human-made environmental challenge for the city to cope with (Montejano Castillo & Torres Zárate, 2011; Perló Cohen & González Reynoso, 2006).

Several strategies and policies were proposed to alleviate the problem, ranging from agroindustry projects to holiday resorts and urban expansions (Espinosa Castillo, 2008). However, since Mexican laws stated that all bodies of water belong to the nation, the reclaimed land was national property. Therefore, the projects designed to cope with the issues of the lake depended on political actions at the federal level, while its environmental effects were felt in Mexico City and the land was physically in the State of Mexico. This created a rather complex situation in which all the political levels involved tried to forward their own strategies, due to which the same parcels of land were granted to sever-

22 Mexico City's natural risks also include high volcanic (Siebe et al., 1996) and seismic (Guéguen et al., 2002) activities.

23 Tenochtitlan was the name of the capital of the Aztec empire. After the Spanish conquest, Tenochtitlan became Mexico City.

24 This is the period of major works; however, drainage and flood-protection systems have permanently been subject to an upgrade and expansion process for the last 600 years (Perló Cohen and González Reynoso, 2006).

al groups for all the different projects proposed, at different moments by authorities of all levels. This created a huge confusion on the property of the land that made impossible the development of any of the projects proposed, situation that created further confusion and inaction (Espinosa Castillo, 2005, 2008; Montejano Castillo & Torres Zárate, 2011).25

The environmental problem of dust storms finally started to be solved in the 1950s. This problem was solved thanks to the unexpected effects of another policy operating at the national scale: the economic modernisation of the country. Economic modernisation boosted Mexico's urban transition, and attracted millions of new urban dwellers to the city, that eventually occupied the vacant land of former Texcoco Lake, taking advantage of the confusion in the property of the land (Ferras, 1977; Montejano Castillo & Torres Zárate, 2011; Palma Galván, 2007). Dust storms stopped to occur because the source of dust was located in the area used for the expansion of the city in the 1950s.

Urban Transition in Mexico: The emergence of Neza

The demographic transformation of the Mexican population from rural to urban started in the 1940s, and is largely due to the process of rapid industrialisation and economic growth that took place from 1930 to1980. During this period, Mexico City became the principal industrial centre in the country, and the main destination for rural immigrants. In the decade of the 1940s, the city represented 7.9% of the national population, and in 1980 this proportion was 18.2%. (Garza, 1990; Montejano Castillo & Torres Zárate, 2011). This industrialisation rapidly increased the demand for workers, and in consequence the demand for urban land and housing also increased (García Peralta, 2013). However, while the national agenda of economic modernisation was carefully planned, *"equivalent blueprints for worker housing and urban expansion did not exist"* (Platt, 2010, p. 584). This means that urban growth largely happened outside the regulation of local governments in the form of self-help settlements. This occurred even though housing provision policies began in 1950, as the number of housing units produced by the state was permanently outnumbered by the growing rates of demand. Policies focusing on housing provision represented 37% of the increase in housing stock from 1971 to 2000, while 60.4% of the production was self-help, the remaining 2.6% correspond to formal housing privately built (García Peralta, 2013).

Mexico City's expansion followed a similar trajectory as those observed elsewhere in the Global South, where *"the expansion in the urban population has occurred without the needed expansion in the services and facilities essential to a healthy urban environment, especially the provision of water, sanitation, drainage and solid waste management"* (Satterthwaite, 2013b, pp. 310-311). In the case of Mexico City, urban expansion was also characterised by illegal land take overs, counting with the tacit consensus of

25 Other factors in the failure of the projects are the harsh environmental conditions of the area, which made it impossible to be used as farm land due to the saline soil, and for the same reason difficult to build on, as built structures rapidly deteriorate from the corrosive action of salt (Espinosa Castillo, 2008).

local authorities, given that this type of urbanisation did not require official investments in infrastructures and public services provision. However, as illegal take overs proliferated, urban policies shifted towards a discourse of enforcement of city plans and regulations, which was translated into forced evictions and demolition of houses (Platt, 2010).

In addition to this, in the 1960s, the local government of Mexico City enforced containment policies for urban sprawl within its political and administrative boundaries. This supposed that new urban dwellers, mostly poor rural immigrants, had to settle outside the city limits in the neighbouring State of Mexico (Maffitt, 2014), often on steep hillsides and sunk lakebeds prone to flash floods and dust storms (Platt, 2010), fostering urban sprawl beyond the city's jurisdiction, and incorporating multiple municipalities (Garza, 1990; Platt, 2010). Some of the first self-help settlements were created in this period. The biggest of these settlements, Ciudad Neza, was built on the lakebed of former Texcoco lake (Montejano Castillo & Torres Zárate, 2011). Despite its unfavourable environmental conditions, *"Neza, with its privileged location just over the state line, was an obvious first choice"* (Castillo, 2001, p. 107) for the masses of residents that were forced to settle in the periphery.

First settlers

The emergence and growth of Neza has been shaped by its rapid urbanisation, boosted by waves of rural-urban migrants attracted to Mexico City seeking better economic conditions, as well as by the prohibition of further urban expansion within the limits of Mexico City. Neza began the process of its urbanisation early in the decade of the 1950s with an initial population of a few thousands (Castillo, 2001), which rapidly grew to its current population of 1.1 million (INEGI, 2010b). According to the 1970's census (Secretaría de Industria y Comercio, 1971), nearly 30% (159,612 inhabitants from a total of 580,430 in 1970) of Neza's population was born in a different state than the State of Mexico or Mexico City. From the total population that migrated from other states (see Appendix 11, and Appendix 12 for a full list of the origin of migrants to Neza in 1970), nearly 60% migrated from only four states26: Michoacán (17.2%), Guanajuato (15.3%), Oaxaca (13.3%), and Puebla (12.8%). Only 661 (0.4%) inhabitants were born in other countries.

Beyond the place of origin of its population, Neza's inhabitants also reflect the diversity of Mexico's ethnicities. Mexican society is ethnically vastly diverse. According to INEGI (2016b), there are 72 different ethnic indigenous groups in Mexico, which represent 7% of the population of the country. And furthermore, 11 different indigenous linguistic families are recognised in the country, with 68 linguistic groupings and 364 linguistic variants (Instituto Nacional de Lenguas Indígenas, 2008). In Mexico, the number of indigenous-language speakers is used as proxy to estimate the number of indigenous

26 Mexico is integrated by 32 states (see Appendix 12)

population (INEGI, 2010b). In the case of Neza, in 1970, a total of 5,531 (1% of Neza's population in 1970) inhabitants were identified as indigenous, speaking mainly eight different indigenous languages (Table 7) (Secretaría de Industria y Comercio, 1971). Thus, Neza is a settlement of great cultural diversity, which is also expressed in ethnic-specific practices.

Table 7. *Number of indigenous language speakers in 1970*

Language	Population		Bilingual in Spanish	
	Total	%	Total	%
Mixtec	1,358	24.6%	1,320	97.2%
Nahuatl	1,146	20.7%	1,120	97.7%
Zapoteco	1,138	20.6%	1,133	99.6%
Otomi	797	14.4%	776	97.4%
Mazahua	250	4.5%	240	96.0%
Mayan	180	3.3%	179	99.4%
Purepecha	159	2.9%	149	93.7%
Totonac	81	1.5%	81	100.0%
Other indigenous languages	422	7.6%	340	80.6%

Note: See Appendix 13 to see the distribution of indigenous languages spoken in Neza by state

Source: Secretaría de Industria y Comercio (1971)

Neza: a self-help settlement

The final stage of Mexico City's lake drainage process left behind a piece of land that was turned again into a swamp in rain season and in a salty, dry, dust-storm prone desert during the dry season. The result of a longitudinal process of enhancing the resilience of Mexico City through flood-proofing it (Espinosa Castillo, 2008), produced land in the outskirts of the city which could not be urbanised. However, unlike the City scale where the urbanisation process mobilised all kind of governmental resources; in Neza, at the local level, the only resources that were mobilised were those that settlers had at hand: the engagement and participation of the community. The harsh environmental conditions of Neza's location was only one of the challenges that the community had to cope with to build their city, as these were exacerbated by the illegality of the urbanisation process, and ineffective governance.

Contrary to the traditional belief on the origins of Neza as being the result of a land take-over by its settlers; Neza is the product of fraudulent land sale by a group of illegal developers who took advantage of the uncertainty in the property of the land reclaimed to the lake, and illegally sold it to Neza's residents. This, in combination with the massive demand of urban land resulting from the industrialisation of the city, the prohibition of Mexico City's urban expansion, and the very likely participation of corrupt authorities (Castillo, 2001, 2010; Espinosa Castillo, 2008; Ferras, 1977), made it a very profitable business opportunity.

Laws at the time required that every new urban development comply with state regulations for urban services: paved streets, street lighting, water and sewage infrastructure, and areas for public facilities; requirements that were advertised and promised by Neza's developers. However, it was evident early on that the developers were never going to meet their promise (Ferras, 1977; Montejano Castillo & Torres Zárate, 2011; UN-Habitat, 2003). Neza's real estate fraud was enabled by the uncertainty in the ownership of the land, and its further sale only made it more uncertain; meaning that virtually none of the settlers had legal land titles. This condition in turn, made it legally impossible for settlers to request public services from the government (Espinosa Castillo, 2008).

The consolidation of Neza depended on the capacity of its inhabitants to negotiate with the authorities and fight for the improvement of their community, including the provision of property rights, the introduction of urban infrastructures, public services and public facilities, and ultimately for their recognition as an independent municipality and its democratisation. The success in consolidating Neza required a sophisticated process led by the community through the creation of several dedicated committees, and community organisations throughout Neza's history (Bassols Ricárdez & Espinosa Castillo, 2011; Espinosa Castillo, 2005; Montejano Castillo & Torres Zárate, 2011; Selee, 2011).

Who planned Neza?

Neza is often referred to as an unplanned, informal or illegal settlement (M. Davis, 2006),27 that was developed without the direct involvement of professional planners, outside the legal planned and regulated modes of city development (Castillo, 2010). However, nowadays when looked from the air28 (Figure 10) it is difficult to believe that Neza was not built following the strict regulations of a government planning office; rather it *"illustrate[s] how evidently planned the area was"* (Varley, 2013, p. 8 [word planned in italics in original]). This planning strategy was only implemented 18 years after the foundation of the settlement, when the State of Mexico's government recognised the problem that an out of control process of urbanisation of this scale could create; in other words, it was planned a posteriori (Ferras, 1977). In 1958, the state government decided to enforce a new law that established the minimum design standards under which Neza was going to be constructed: the land was divided into 25 large pieces of one square kilometre each, with 10% of its territory reserved for public facilities, and street blocks with 50 plots of 150 m2 each. Street hierarchy was also established in this law: regional streets of 40 m wide, principal avenues of 20 m, and local streets of 12 m. Developers were also obliged to comply with state regulations for public services and infrastructures (Montejano Cas-

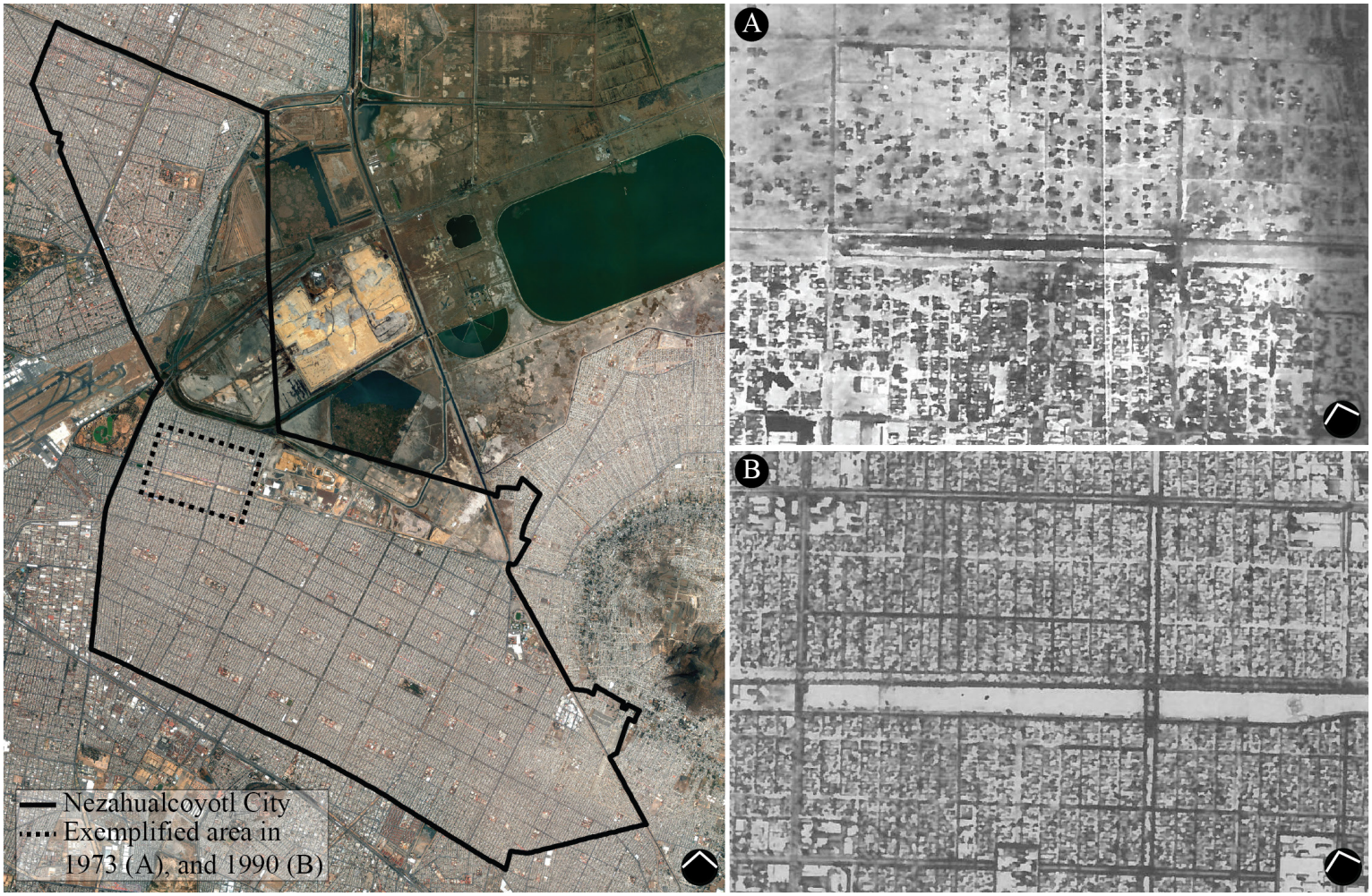
27 Even when the terms slum, illegal or informal settlement are rife in the literature while describing similar settlements to Neza, in this thesis it is considered that the correct term to describe this kind of urbanisation is self-help settlement. For a full rational on the use of self-help settlement in this thesis refer to footnote 2 in page 14.

28 In Figure 10, the darker areas in the 1973 and 1990 images represent flooded areas (Castillo, 2010).

tillo & Torres Zárate, 2011). However, the only regulation that was complied with by the developers were the design parameters; they never built the services and infrastructures (Ferras, 1977).

In this sense, even when Neza's urban form is a product of the enforcement of new laws, the process of environmental enhancement with the introduction of services and infrastructures is largely attributed to its inhabitants who built the city during 50 years (Montejano Castillo & Torres Zárate, 2011). *"Neza was built and transformed by its inhabitants, one house at a time, street by street, operating where developers left off."* (Castillo, 2010, p. 388)

Figure 10. *Ciudad Neza aerial view (2009) and partial historic views (1973, and 1990)*



Source: Author's elaboration, using cartographic information from INEGI (2010a), satellite imagery from Google Earth 7.1 (2014), and historic aerial views from Castillo (2001)

4.2 Framing Neza's challenges

This subsection addresses Neza's first settlers' understandings of the challenges that they had to face during the early stages of the urbanisation of the municipality. This subsection relies on interview data collected during the fieldwork of this research, interpreted through thematic analysis. In particular, the theme of framing challenges29 is discussed in this section, which had a total of 36 contributing interviewees, who provided 577 quotes referring to Neza's early challenges. The analysis of this theme revealed that the challenges previously discussed in this chapter (e.g. flooding, dust-storms, and uncertainty in land tenure rights) were also identified as the most pressing issues by Neza's early inhabitants. Nevertheless, understanding the first settlers' take on the challenges that they had to face provides important insights on the magnitude of the problematic from a personal perspective, and serves to understand how challenges were interpreted as collective goals for the development of Neza's social network (the development of collective goals is explored in section 5.1). One of the key features in the operation of Neza's social network is the understanding of the challenges faced, which in turn fostered collective action. From the answers obtained to asking what challenges Nezahualcóyotl faced at its beginnings, it was possible to understand that from the perspective of the interviewees, challenges and goals were the same thing. Most interviewees' straightforward answer was: 'everything. Every challenge was a goal. Every goal was a challenge'.

Unpacking this answer, more often than not, required multiple follow-up questions from the interviewer. Follow-up replies remained somehow dense. However, two main categories of challenges were identified: environmental, and institutional. While most interviewees described the general challenges presented by the geographic characteristics of the territory; some framed the issue from the perspective of the absence of infrastructures; while others linked the main challenges to the absence of accountable institutions. One constant that was observed, is that interviewees framed the challenges in tandem with the collective goals to tackle them, however, this is discussed in Chapter 5.

Environmental challenges

The environmental challenges Neza faced at its beginnings were multiple. Most of them were explored in section 4.1 of this chapter. Environmental challenges found at the literature review stage were those imposed by the characteristics of the terrain. Being a reclaimed land resulting from the draining of a salty lake, Neza's territory was flood-prone in rainy season, and dust-storm prone in dry season. Dominant winds in the city, in combination with the lack of physical barriers (e.g. mountains, trees, or buildings) made the area whirlwind-prone too. The mere presence of these factors made Neza's territory not suitable for urbanisation, or as one of the interviewees framed it: 'Here was a com-

29 Theme definition: Interviewees' perspective on the challenges that Neza had to face to become a resilient settlement.

pletely inhospitable land, it was a lake, I do not know if you are aware of it?' (A-720). Another interviewee hesitated in defining Neza's territory: 'This was a desert, it was mud, it was a swamp… A swamp. It was a lake… the bed of a lake. Sometimes it was mud-covered, Neza-mud they used to call it. In drought Neza-dust.' (A-628). The answers provide an idea of the complex scenario that early settlers had to face, and serves as a starting point to understand the roots of Neza's collective goals.

Figure 11. *Scattered urbanisation*

Source: Asentamientos humanos en el municipio de Ciudad Nezahualcóyotl [Human settlements in the municipality of Nezahualcóyotl City] (n.d.)

The interviewees identify some environmental challenges almost unanimously. Only one participant said that by the time Neza started to urbanise, there were no floods, and that it was erroneous to frame the problem from that perspective (K-729). The rest of the respondents agreed with the environmental challenges identified in the literature review (seasonal flooding and dust-storming). However, most of the interviewees mentioned environmental challenges and low density or scattered urbanisation (see Figure 11) as part of their answers on the challenges that they faced. This connection between environmental challenges and low urbanisation is here interpreted as if environmental issues were derived from low density urbanisation. In consequence it can be extrapolated that the mere urbanisation of the area was perceived by early settlers as part of the solution of the environmental challenges of the area. This is illustrated in the following quotes from interview participants A-65, and A-724:

When I first arrived, first things first... There was no transport, no light [electricity supply], no water. There was little [water]. A little bit [of water] that came out, and then there was no [water]. Always the scarcity. And the streets full of mud, dirt, stones and puddles. And when it dried, there was dust. And most of all this area was empty. There were no people. After 8, 15, 20 days, a month... half a year, [some people] began to arrive… a little house here, another there. (A-65)

It was in our best interest to urbanise… to be in the conditions in which we are [now]. Because we were not going to be in the flood, in the mud, in the gale for the rest of our lives. And our children too… […] It was not convenient for us to be like this, and that was why we supported it... Well, [we supported] the leaders, we supported them for this to be urbanised and get it improved… and in better conditions. So there would be no mud, definitely. (A-724)

What is implied in A-65 extract (above) is that at the beginning they did have water, but it was insufficient when more people started to arrive (because of a lack of sufficient infrastructure). From A-65's quote it can be derived that early infrastructures were put in place without considering a prospective planning process. However, this interview excerpt also identifies further urbanisation, and increased densities as necessary to achieve a wider range of better infrastructures in the area (and thus a solution to environmental challenges). This, perhaps as the result of pushing the limits of the system to its collapse, and force its upgrading. The quote from A-724 makes a connection between the low urban density in the area, the presence of the environmental problems, and also sees the process of urbanisation as a goal for the reduction of environmental challenges and the improvement of living conditions in the area. This same idea of the need for increasing the density of the area to solve environmental issues is shared by other interviewees.30.

As part of the identified environmental challenges, interviewees also stressed the risks that living in those conditions meant for them. It is important to understand the risks that the environmental challenges pose on peoples' life, as this provides the context for the formation of collective goals. A constant perception among interviewees is that of the risks associated with the low economic base in which the settlement was initially formed, which has a physical expression in the quality of materials used for construction (nondurable materials such as cardboard) (Figure 12). The use of flimsy construction materials exacerbated the effects of the challenging environmental conditions of the area. This is consistent with the idea of accumulated vulnerability, in which low-income groups are at high risk from extreme weather, as their settlements lack the minimum standards to cope

30 Interview sources mentioning low density as part of their answers on environmental challenges are: A-65, C-113, A-183, A-185, A-296, C-352, A-385, A-414, C-415, C-423, C-451, A-557, A-628, A-668, A-708, A-709, A-710, C-714, A-715, A-716, A-717, A-718, A-719, A-720, A-721, A-722, C-723, A-724, A-725, A-727, K-728, K-731, K-732, and K-733.

with any stress or shock (Satterthwaite, 2013a). The following excerpts from interviewees A-717, and K-731 illustrate early settlers' living conditions in regard to the interaction of environmental challenges and the quality of housing construction.

Figure 12. *Houses built with flimsy materials*

Source: Primeros asentamientos humanos en el municipio de Ciudad Nezahualcóyotl (1960-1970) [First human settlements in the municipality of Nezahualcóyotl City (1960-1970)]

> *We arrived in the [year of] 63 […] on the ground we only had a concrete platform of 6 by 4 [metres] without foundations, and a room that was made with cardboard sheets. Then we suffered in the first place from the extraordinary dust. The amount of mosquitoes that affected our eyes. The air that often blew the roofs away… (A-717)*

> *My father tells me that in the early years, when we arrived, around [the years of] 61- 62, […] in the rainy season the lake used to reappear, Neza was flooded again. […] They were very considerable floods, imagine the houses with bare earth floors, and that suddenly [water] rose about 30 or 40 centimetres off the ground level. It was enough to flood the houses, to wet the beds, to wet the stove and the domestic appliances that housewives had. (K-731)*

Interviewees, while identifying environmental challenges, also located the risks and the sources of their vulnerabilities in the poor quality of the materials used for construction. It is also striking that the precarious conditions in which houses were built

meant that people very often had to make the same investment over and over again, which one can only assume, increased their poverty, and reduced their possibilities to build using more resistant materials. In essence, this is the context in which Neza's collective goals emerged.

Institutional challenges

The difficulties experienced by early settlers, due to the harsh environmental conditions, were exacerbated by the institutional context. In this section, provincial government practices that excluded Neza residents from the benefits of the state, and the uncertainty of land tenure are explained as part of the challenges that Neza residents had to cope with, in order to increase the resilience of the settlement.

Provincial government practises

One of the challenges that early settlers faced when they arrived to Neza, was the lack of an appropriate institutional framework to address their problematic. As part of the answers obtained from interviewees to the question of what challenges had to be faced by early Neza settlers; most respondents identified a series of institutional obstacles for the resolution of Neza's environmental challenges. These were: being treated as outsiders, and even invaders, and thus not deserving any institutional help; taxation of their land without any public investment; open repression from the state; and ethnic conflicts. Formally, Neza's territory belonged to Chimalhuacán municipality (Espinosa Castillo, 2005, 2008), a traditional, well-established indigenous rural settlement (Chimalhuacán municipality is located east of Neza, see Figure 7 in page 85). Thus, Chimalhuacán collected property taxes in Neza, however, taxes were not reinvested in the construction of infrastructures in Neza. Eventually, Neza inhabitants realised that their interests were not represented by the Chimalhuacán municipality, and they needed their own authorities. Also, according to some interview sources (A-725, A-65, A-720, A-385 and A-185) Chimalhuacán inhabitants felt that Neza residents had invaded and stolen their territory. For the people of Chimalhuacán, Neza inhabitants were foreigners, and as such did not deserve the same rights. Some authors suggest that closed groups of people tend to have strong feelings of belonging, narrow visions of the world, and strong 'us and them' feelings provoking the exclusion of outsiders. In this sense, social capital can be negative when its outcomes do not benefit the whole society (Harriss, 2002). In the case of tensions between the people of Chimalhuacán and Neza residents, these were caused by ethnic differences between them, and a strong sense of belonging among Chimalhuacán inhabitants.

Examples of feelings of exclusion were present in several interviews. From the perspective of participants, there was a clear rejection from the municipality of Chimalhuacán towards them. According to interviewees, this rejection was due to the ancient origin of Chimalhuacán municipality, as an Aztec community (see A-720's quote below).

And as such, there were ethnic differences that prevented them from having a cooperative behaviour towards Neza residents, who migrated from different parts of the country, and had multiple ethnic origins.

> *And they [Chimalhuacán] always neglected this place. We used to go […] seeking for attention in relation to municipal public services, and we were not attended. That was the fundamental reason. Because we were… come on, we were different. The history of Chimalhuacán, as you know, it is a native people, it seems that it is Aztec, that it is Nahuatl.31 Then "they said, we are from Chimalhuacán, and these people come from I do not know where… They cannot mix with us, we are different." (A-720)*

Some interviewees consider that the lack of attention from Chimalhuacán was due to the backwardness of Chimalhuacán's people. Others consider that given that Chimalhuacán was a rural community, they did not have an appropriate understanding of what being urban meant. Thus, they neglected the territory of Neza.

> *Chimalhuacán functionaries did not have the political vision... They were small townspeople. Chimalhuacán was small… its functionaries were townspeople, without the political vision and without the capacity… (A-710)*

> *We belonged to the municipality of Chimalhuacán. A completely rural municipality… And the people that made Nezahualcóyotl came from Mexico City. Maybe many people were of rural origin, but they had already left those activities, and also there was nowhere to exercise those [activities in Nezahualcóyotl]. There, in what is the town of Chimalhuacán, there were orchards, there were vegetables... But here we were called the colonies32 of the Texcoco-lake… (A-385)*

> *If we belonged to a municipality... excuse the expression, without intending to be pejorative, pre-Hispanic, very old... but with little money, with little budget to meet the demands of their old communities... much less they were going to have money to meet the demands of some colonies that were growing, and growing… (C-423)*

These quotes tell us that even when Neza settlers were originally rural migrants, all agricultural activities they used to practise were left in the past at the moment they arrived to the city. Also, given that the area was named 'colony', which is the Mexican word for urban neighbourhood, it was clear that Neza residents expected to have the urban-living standards they got used to in Mexico City in their new settlement. From the perspective of interview respondents, Chimalhuacán was unable to provide urban services in Neza:

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31 *Nahuatl* is the language that *Mexica* cultures speak, including the Aztecs.

32 *Colony* is a Mexican term for an urban neighbourhood. The term *colony* will be used throughout the thesis and will refer to such concept.

... frankly they didn't pay any attention to these lands... Well, they didn't even pay any attention to theirs, where they lived, [therefore, they paid] less [attention] to these [lands] that were totally abandoned… That is the overwhelming reality. (K-730)

Other topics for conflict between Chimalhuacán and Neza settlers, was the perception that people of Chimalhuacán owned the land. They felt that this land ancestrally belonged to them, as well as all the resources within them, including fresh water wells. Both the disputes for the property of land, and the use of fresh water sources, made the relation between the peoples of Chimalhuacán and Neza, a very explosive one.

...They used to come to attack us with stones. They carried slingshots that threw the stones. Several times they attacked us. (A-725)

... [people from] Chimalhuacán were opposed to part of their territory being taken away from them, there was also a well, and a tank of water on the hill that provided water to Nezahualcóyotl, well to what used to be the Texcoco colonies… then, one day, they publicly threatened that they would leave the colonies without water. Here [in Neza], the leaders of the organisations called for help. They asked for help and soldiers were sent to guard it [the well and the tank of water] … A guy came, accompanied by several, but one of them was carrying a cartridge of dynamite to dynamite the tank... The soldiers told him to stop, but he did not want to stop, and they shot him, they killed him there. And that way an open confrontation started [between Neza and Chimalhuacán]. (A-385)

It is important to recall that there was no clarity on the tenure of land in the area. Also, given that the area originally was a salty lake, there was a very limited availability of fresh water. Thus, for the people of Chimalhuacán, Neza residents were not only the invaders who had despoiled Chimalhuacán from their lands, but also their natural resources.

Reasons not to provide services to Neza were also found in the state government. According to a former governor, there was the idea that the issue of new migrants settling in the state's territory was the result of the implementation of Federal policies, and therefore, solutions had to come from the national government. As respondent C-352 explains:

The former governor [Juan Fernández Albarrán (1963-1969)] said, and he was not entirely wrong, that the issue of the urbanisation, as a result of the flow of the rural population to the great cities of the country, was part of the population policy that was in the hands of the federal government. That the instruments for managing the population were largely outside the functions that constituted, and pragmatically corresponded to, local governments, especially the state government. Then he was partially right to say that that population and demographic politics were federal matters. And he said, they are not people from the State of Mexico, nor did we bring them here, nor are they here because they are interested

in the State. […] They came here because they are near Mexico City and they came to look for a roof and work. The Federal government had to take care of their problems. (C-352)

This quote reveals a rather provincial understanding of what governing meant at the state level. This is very similar to that of the people of Chimalhuacán at the municipal one. For them, government action, and access to common resources, was only available for whom they considered to be their citizens. This form of government seems to be an expression of closed social capital.

Uncertainty over property rights

One of the problematics that were found in most of the interviews analysed for this research is the uncertainty on property rights. This problematic was also present in archives, and processed as part of the social network analysis presented in Chapter 6. However, the difference between archive data, and the information collected in interviews, is that in the interviews the issue of land tenure was presented as the main challenge by most of the participants, while in the SNA stage, this collective goal gathered a rather small number of participants, in comparison with the collective goals of water supply, drainage, public transport, and paved streets (basic collective goals). Also, when comparing the number of participants of the other strategic goal, municipal independence, the number of interviewees mentioning this issue is smaller than the number of network participants engaged in the collective goal of achieving municipal independence (this is furthered discussed in Chapter 6) . This might be because there is a much longer period of time between the peak in the collective action for municipal independence (1957 – 1963), and the moment of the collective action for land tenure (1968 – 1974). Thus, most of the interviewees participated in the land tenure goal, while just a few did in that of municipal independence. However, most of the interviewees did state that achieving municipal independence was relevant for them, as it gave them some institutional representation to advance their agenda.

The problematic of Neza's land tenure is very complex and to understand it, it is necessary to see the combination of several factors that produced a state of uncertainty on who owned the land (this was discussed earlier in section 4.1 of this Chapter), but it is worth explaining again:

- The area was a lake, the constitution states that water masses belong to the nation, and cannot be sold or purchased as private property.
- President Benito Juárez (1858 – 1872) signed a presidential order giving these lands to the community of Chimalhuacán, as communal property.

- President Lázaro Cárdenas (1934 – 1940) also signed a presidential order, giving these lands as a gift to the generals of the Mexican Revolution. Cárdenas presidential order bypassed that of Juárez.

- There are also multiple state orders assigning the property of these lands to other actors, bypassing both previous presidential orders.

- Several purchase agreements between Neza developers and Chimalhuacán exist, but as this area was a lake and communal property, it was illegal to acquire them for private interests. Furthermore, previous presidential and state orders assigned the property of the land to multiple parties. Thus, the property of the land was unclear.

This confusion on who owned the land opened the door for fraudulent transactions. One of them, which can help explain the opposition of Chimalhuacán to the development of Neza, was the way the land changed hands between Neza developers, and the people of Chimalhuacán. According to one of the interviewees, this acquisition was a con, which was designed to despoil Chimalhuacán inhabitants from their land.

> *It is said that they told to the comuneros33 of Chimalhuacán… "bring your documents that certify [you as land owners] to make you a cheque, so you can collect your money." […] It is said that all of those who took their documents, of course not all [of the comuneros of Chimalhuacán], because many protested and disagreed [with the purchase], but those who were deluded feeling the mirage of money, delivered their documents. And those documents were valued… 30 million pesos [375 thousand dollars].34 And we're talking about the 1940's! But of that money, my dear friend, not a dime was given to them. They went to the bank to cash [the cheques], and the bankers told them that there were no funds. And they never gave them anything. (A-65)*

This fraudulent land ownership transfer was allowed by the Government of the State of Mexico as a cooperative nexus existed between the state government, and Neza developers (this is further explored in Chapter 7). The fraudulent ownership of Neza's land was then used to sell Neza land as part of a large-scale real estate operation. This operation relied on the high demand for cheap urban land that Mexico City experienced from the 1940s. As Governor Hank González (1969-1975) expressed in an interview book by Fernando Benítez (1999), the transaction of cheap land was facilitated by the fact that the land was not even the property of the developers.

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33 *Comunero* is a member of a community, with rights to use the commune land belonging to a particular community. *Ejidal* and communal refer to traditional forms of property in Mexico. These forms of property are collectively owned and until 1992 it was illegal to privately own such communal land.

34 Currency conversions from Mexican pesos to American dollars were done using Mexico's central bank historic US dollar – Mexican peso exchange rates for the year of 1972 (1 American dollar = 0.0125 Mexican peso) (Banco de México, 2017)

"Why were so many people settling in the State of Mexico? Because there they were sold very cheap lots of ejidal, communal or federal land. Sure, they were almost given away because those lands did not belong to the vendors." (Benítez, 1999, p. 249)

This fraudulent behaviour was then maintained during all the operation, as the operation was designed to use the uncertainty over land property to sell it in very advantageous ways to rural migrants, who were extremely poor, and were in many cases illiterate (Ferras, 1977). According to some interviewees, acquisition contracts stated that in case buyers failed to meet three monthly payments, they would automatically lose their rights on the land in favour of the developers.

We started to live here permanently in 1969. At that time, we were united because there was a movement for the problem of land tenure, which was very irregular. We bought [a lot] and more owners and more owners [of the same lot] appeared. The developers sold many times. The same lot was sold several times, and then the problem arose, that several people wanted the same [lot]. So that was why the movement [for the achievement of secure land tenure rights] was made, so land tenure could be regularised. (A-725)

The challenge of land tenure was also connected to the rest of the basic collective goals (water supply, drainage, public transport, and paved streets). As part of the purchase agreements signed between the developers and Neza residents, buyers were promised the construction of the necessary infrastructure. But these were never built.

And there were purchases to the developers. Many! But they did not comply with the services [paved streets, pavements, water supply, and drainage]. That is why people had to unite to fight to get [them]. (A-725)

4.3 From environmental disaster to thriving area: A community- driven transformation

The evidence discussed so far in this chapter suggests that the area in which Neza is situated presented challenging environmental conditions, which were exacerbated by institutional challenges, and that the combination of these factors made an extremely difficult setting to develop a city. Furthermore, the challenges for Neza's urbanisation as discussed in the literature, correlate to the perception of early settlers interviewed for this research. This section offers an academic perspective to the sayings of Neza residents presented in the previous section on the community engagements of Neza residents in the solution of environmental and institutional challenges, and provides more elements for the selection of Neza as case-study.

Given that the land on which Neza is built was alkaline and flood-prone, early settlers had to develop a way to build under these conditions; task which was made even harder by early dwellers' extreme poverty (Espinosa Castillo, 2008). Some of the first buildings in Neza were built using salvaged materials from a nearby city landfill as housing construction materials. Houses were built on poles, to avoid both flooding and the corrosive action of the alkaline soil. Poles were later removed, as new construction techniques were developed by the community, which allowed substituting the materials of the construction with more durable ones, such as bricks and concrete, in an incremental process that continues to this date as Neza develops. This typology of incremental construction was repeated all over Neza, and allowed its inhabitants to go from flimsy constructions to durable buildings (Castillo, 2010; Montejano Castillo & Torres Zárate, 2011).

Figure 13. *View of Neza in 1959*

Source: Garcia Cobo (1959)
Title: The birth of Neza [El nacimiento de Neza], 1958
Author: Héctor García
Image used with permission of: Fundación María y Héctor García [María and Héctor García Foundation]

Some of the first infrastructures and services were collectively built by Neza's inhabitants, contributing both with labour and financial resources. Given that the main environmental challenge to cope with was the seasonal flooding, the first infrastructures being built were open-air canals as makeshift drainages, and improvised electric power supply (see Figure 13). And to facilitate physical access to Mexico City (where all Neza

dwellers worked and relied on economically), residents built and paved some streets, and negotiated with some transportation companies to provide public transportation (Montejano Castillo & Torres Zárate, 2011), while the service of fresh water depended on civic groups that organised the provision through water tankers (Castillo, 2001, 2010).

Even when some progress was achieved through the sole collective action of Neza's residents, these were only marginal achievements and much more needed to be done. However, early in the process, Neza's settlers understood that to make more effective demands to the government for the fulfilment of sales agreements, including the construction of infrastructures and the recognition of their land tenure, they had to be recognised as an independent municipality. From 1960, residents organised themselves into a federation of neighbourhoods to demand their recognition as an independent municipality, pledge that was granted in 1963 (Alba & Oropeza, 2014; Bassols Ricárdez & Espinosa Castillo, 2011; Castillo, 2001; Espinosa Castillo, 2005, 2008; Montejano Castillo & Torres Zárate, 2011).

The recognition of Nezahualcóyotl as an independent municipality indeed accelerated the introduction of services and infrastructures as the municipality began to have an independent budget. However this budget was rather insufficient as the municipality had a very small economic activity (as most of Neza's settlers' jobs were located in Mexico City) (Selee, 2011). Thus, after the success in becoming an independent municipality, settlers decided to make further demands to make the developers finally provide the promised services, infrastructures and property titles. During the decade of the 1970s, a large-scale community organisation counting with 70,000 members organised in 48 committees across Neza, structured a payment boycott strategy against the developers, seeking state intervention to expropriate the land from the developers who never built the infrastructures (Montejano Castillo & Torres Zárate, 2011).

However, since Mexico at the time had a single-party political system, in which the party and the government were almost interchangeable terms, those organisations that opposed the interests of the party were largely ignored. The payment boycott movement was contrary to the interests of the party; its success is attributed to its large scale. The size of the movement forced the authorities to meet their demands -expropriate the land, recognise the payments that had been done to the date, continue the sale to the settlers at discount rates, provide legal land titles and the construction of infrastructures and public services-. This was largely granted in exchange for their political loyalty, which resulted in all the authorities elected in the municipality until 1996 being members of the same political party (Castillo, 2001; Ferras, 1977; Selee, 2011). Finally, after the success of the payment boycott movement, several organisations were created. Some of these organisations were co-opted by the single party system, some others started to create horizontal links between them, and in 1996 they defied the single-party political system, turned a

loose coalition of popular organisations into a governing party, forwarding political alternation between parties, and a much more democratic and accountable political system (Selee, 2011).

Interestingly, in recent times there has been a grassroots movement in the northern part of the municipality (North Nezahualcóyotl), looking for their recognition as another independent municipality. This movement has been ignited by environmental factors as the increase of seasonal flooding in recent times, that the community perceives as the product of a selective implementation of public improvements that benefits only the southern part of the municipality (Bassols Ricárdez & Espinosa Castillo, 2011). This is interesting because it might imply that given the observed trajectory of the municipality, with the construction of government accountability at the local scale, Northern Nezahualcóyotl residents could be replicating the process that initially allowed the positive transformation of their environment.

4.4 Concluding remarks

This chapter has explored the contextual factors that explain how Neza residents found themselves living in a challenging area, both in environmental and institutional terms, and why they resorted to bottom-up organised action to tackle the challenges they faced. This chapter argued that Neza's urbanisation is the product of the sum of poorly executed public policies at national and municipal level, and the historic process of land reclamation from the lakes for the expansion of Mexico City. First, national economic policies, aimed to the industrialisation of the country, forced rural workers to migrate to Mexico City. Second, the lack of a safe and secure land market, and the enforcement of anti-urban-growth policies in Mexico City, in addition to the uncertainty on the status of land ownership of the land reclaimed to the lakes, opened the possibility of a large-scale real-state fraudulent land sell to new rural migrants. Third, land ownership disputes, along with localist and provincial institutional practices that excluded outsiders (migrants coming from different regions of Mexico) from the benefits of the state, restricted the construction of necessary urban infrastructures in the area, which exacerbated the environmental challenges (floods and sand-storms). These are the factors that forced early Neza residents to rely on their collective engagement to seek for the solution of the challenges that the context posed to them.

In conclusion, as the evidence discussed in this chapter suggests (both, academic literature, and interview sources), Neza is an appropriate setting for the investigation of the contribution of social capital in the resilience of self-help settlements. This is it because community organisations were fully engaged in the achievement of the multiple collective goals that have shaped the municipality during the process of transformation of Neza. Early on, community organisations managed local volunteer labour for the construction of infrastructures. Later, larger associations were formed to negotiate with

the state and the developers for the independence, consolidation and democratisation of the municipality, process that might still be present today in the municipality (Espinosa Castillo, 2008; Montejano Castillo & Torres Zárate, 2011; Selee, 2011). The evidence presented in this chapter informed the selection of Neza as the case-study of this research. In the following chapters, findings of this research on the structure and operation of the social network that forwarded the resilience of the settlement are presented. The following chapter builds on the information provided in this chapter about the challenges faced by early Neza residents, and argues that these played an important role as starting points of community engagement.

5. Group formation

This chapter provides some explanatory elements to answer the sub-question of 'How do networks of social capital operate for the resilience of self-help settlements?' (other elements are discussed in Section 7.2). Specifically, this chapter explains the formation of groups as part of the operation of networks of social capital. Chapter 2 explained that the function of social capital is productive, meaning that it facilitates the achievement of some goals that in its absence could not be possible (James S. Coleman, 1988). Chapter 2 also introduced the different types of social capital (bonding, bridging, and linking), which describe the connections of collaboration between people, at the local and extra-community scales, required to achieve different types of collective goals. Building on the challenging context described in the previous chapter, this chapter analyses how initial challenges were reinterpreted by early Neza residents as collective goals to be achieved through community engagement. Also, the formation of different types of groups of social capital aiming to achieve the diverse set of goals necessary to face the challenges of early Neza residents is explored. In this sense, the focus is placed on the cultural and institutional practices that facilitated collaboration at the interior of the community and beyond. To do this, the background of early settlers is analysed, focusing first on the shared origin of early Neza residents as poor migrants seeking for better opportunities, and second on the role of culturally-embedded practices in boosting collective action. Both factors are interpreted here as means for the formation of bonding, and bridging groups at the interior of Neza. The third part of the chapter explores the role of politics in the formation of linking ties with extra-community actors, as a mechanism to achieve goals that escaped the possibilities of local action.

5.1 From environmental and institutional challenges to collective goals

This section explores the development of the collective goals that allowed Neza residents to overcome the sources of their vulnerability. These goals served as starting points for the formation of social groups. Two distinct types of collective goals are identified. Some tackled the physical and environmental challenges of the territory and relate to the construction of infrastructures: water supply and drainage networks; paved streets and public transport systems. These collective goals were aimed at solving day-to-day needs and are therefore referred to in this thesis as basic collective goals. Others referred to the development of accountable institutions as a necessary step towards the achievement of basic goals. These strategic collective goals were municipal independence and the achievement of land tenure rights.

Although six independent collective goals are investigated in this thesis, interviewees of this research rarely identified their engagement around a single collective goal. Instead interviewees mentioned that their engagement in collective actions, happened around groups of collective goals, usually in the form of a mix of basic and strategic

goals. The engagement of participants in multiple collective goals is corroborated by the social network analysis discussed in Chapter 6. Nevertheless, this section describes each collective goal independently, relying on the perceptions of interviewees. This serves as confirmation that the collective goals that were pre-selected as embedded units of analysis were indeed the most relevant ones for the interviewees, and that they served as starting points for collective action.

Basic collective goals

Initial collective efforts in Neza were focused on making the area habitable through the pursuit of basic collective goals. Meeting these collective goals allowed Neza residents to get the very basic means for survival (fresh water provision), reduced the probability of flooding (drainage and paved streets), reduced the intensity of dust storms (paved streets), and allowed the economic viability of the area (paved streets in combination with public transportation).

Fresh water supply and drainage infrastructures

During the interview process, as previously discussed, the first answer to the question of what were the challenges that were faced in Neza at its beginnings was: everything, everything was a challenge. However, the second part of the answer consistently was water supply (along with drainage). Thus, fresh water supply (see Figure 14) was the first and most urgent goal to be met by early Neza settlers. This was also found in the analysis of Neza's social network discussed in Chapter 6.

> *...water, drainage… That was the scarcest, the obvious things, the most urgent to meet, the most pressing needs. (A-709)*

Indeed, fresh water supply and drainage were the most pressing needs. Even when water and drainage infrastructures were present in some areas of Neza, these were insufficient, as they were only temporary infrastructures, which were then improved through the voluntary participation of members of the community.

> *Well, [we had] all the problems. Because there was nothing. There was nothing. The drainage was deficient... Most of the streets had open-air drainage. (A-712)*

In the case of water provision, the presence of early infrastructures was detected in interviews. However as described above (A-65), early infrastructures were not adequately planned to accommodate the full demand of Neza residents. Instead, interviewees describe an incremental process that went from the collapse of early infrastructures, the implementation of mobile infrastructures (water tankers), to the implementation of sufficient infrastructures.

Figure 14. *Provisional fresh water supply*

Source: Toma provisional de agua potable en algunos lugares del municipio de Nezahualcóyotl [Provisional potable water faucet in some places of the municipality of Nezahualcóyotl] (1973)

> *The first public water faucet, was the only faucet for every 10 streets, to tell you something, that served several streets... Then you can imagine, given the over-density of families, those public faucets were insufficient... We had to queue for several hours. (K-731)*

Given the increasing demand of water provision, unmet by the capacity of infrastructures, water started to be provided informally by private stakeholders. The provision of water by these mobile infrastructures was both pricy and unreliable. This made the collective goal for water provision one of the first and more important ones:

> *There was no water… Here we used to buy water tankers, the people [used to buy] by the drum of water. Each drum of water [used to cost] 5 pesos [0.06 US dollars]. Each one of us used to have our own drum, there in a place in the corner where we used to put the water. And we used to save the water, so that it would last until the next time the water tanker passed... We lived this way, until we became fed-up... It was an intense revolt! (A-557)*

> *Well back then, we had no water, and we were all bringing the water, even from the city centre, in trucks. We used to go to some [public] water faucets that were on Zaragoza Av, where we loaded the water. We would come and bring it here. Many people worked selling the water by the drum, it was a huge business! They*

sold each drum in 5 pesos. Then those who had a truck, used to bring 5 drums each time, and sold the water to 5 pesos each drum to the people who wanted it. (A-715)

Although water infrastructures were insufficient, inhabitants were still charged for the service by Chimalhuacán municipality. When the municipality of Nezahualcóyotl was created, this continued. That is, Neza residents were being charged for a service that they were not receiving. And furthermore, when Neza residents refused to pay for it, they started to receive eviction notices in case of failing in the payment of the service. According to some participants of this research, this abusive institutional behaviour also pushed Neza residents to organise around the collective goal of water provision.

Water shortages began. When the water started to run out, we started to receive notifications of eviction if we did not pay, and that is how water became our first goal… Then we covered others [goals], including schools… (A-385)

Paved streets and public transport

Figure 15. *Unpaved streets in Neza, 1970s*

Source: Primeras banquetas de las diferentes calles de la colonia Estado de México [First pavements in different streets of the State of Mexio colony] (1977-1978)

Following the collective goals of water supply and drainage infrastructures, there were those of paved streets and public transportation (Figure 15). Interviewees perceive both collective goals to be part of a strategy seeking for the settlement's economic via-

bility, as they were necessary to allow Neza residents to commute to work (see A-709's interview extract below). The collective goals of paved streets and public transportation were seen as part of the incremental process towards the consolidation of the settlement, and were second in the scale of community priorities, after those of water provision and drainage infrastructures.

> *... paved streets to be able to go to our jobs... because back then, there were already some public transport [networks] that were called chimecos35... (A-709)*

Figure 16. *Public transport in the early 1970s*

Source: Línea de transporte cubriendo la ruta cuchilla del tesoro - San Lázaro Merced Oceanía [Transport line covering the cuchilla del tesoro - San Lázaro Merced Oceanía route] (1970)

Early public transportation infrastructures (see Figure 16) were present from the very beginning of the settlement. However, its coverage was insufficient. Transport companies did not want to access the settlement due to the risk of damaging their bus fleets given the precarious state of streets:

> *At the beginning there were several demands. There were plenty of demands... It was like a very large menu, a very rich menu in terms of demands. People complained that buses did not come frequently... And the bus companies complained*

35 *Chimeco* is the informal name used in Neza to refer to the historic bus company that provides the service of public transport in the municipalities of Nezahualcóyotl and Chimalhuacán.

about how they would enter, if in the rainy season there were many holes in all the streets… It wasn't that they did not enter, it was that they got stuck on their way in... (K-731)

Paved streets and public transportation were also necessary to provide economic diversity to the area. Even when the following quote talks about the need for public transportation to facilitate workers' commute, it also provides the idea of the need to diversify the economic activities in the settlement: and in that way, to transform the settlement from a dormitory town to a full functioning city.

The main thing was to establish the public transport, to take [the people] out. Because before that, they had us as a dormitory town. A municipality hotel, we just got here to sleep and then leave. And then to get that great number of workers who went to the city centre, […] to the big factories, there was not the necessary transportation […] Then we demanded precisely transport. Not even a good one… But a very basic one to that took the people out. (A-716)

Similarly to other collective goals, those of public transportation and paved streets were intertwined. Neza residents perceived paved streets to be a collective goal, in order to have public transportation. Only after meeting the collective goal of paved streets, public transportation was also achieved:

Because it was all destroyed. In relation to the streets, there was mud, there was... Well, they used to get stuck there… They could have disgraced their motors, or their tyres… They did not want to drive through. But later, when they [the government] fixed the streets, [transport companies] started [to drive through Neza]. (C-415)

From the previous quote, it is also possible to interpret that meeting the collective goal of having paved streets was achieved relying on external help from the government. The construction of paved streets was forwarded by the collective action of Neza residents. First, Neza residents engaged in collectives of neighbours who worked together to enable streets for transit use: bringing materials, and providing labour to cover the holes in streets. And in a second stage, they organised to seek external help for the construction of streets:

In Nezahualcóyotl there were no paved streets, no pavements, no kerbs. We were the ones who requested them... (A-719)

Strategic collective goals

In order to meet basic goals, Neza residents also had to organise around strategic collective goals: municipal independence, and secure land tenure. While basic collective goals were concerned with the construction of fundamental infrastructures to cope with the environment; strategic goals were necessary to cope with institutional challenges.

Given that Neza's territory was embedded in an existing institutional framework, it was natural for Neza residents to seek help in existing institutions (Chimalhuacán municipality). But when these institutions proved ineffective in addressing the needs of Neza residents; Neza residents decided to build their own institutional framework, able to represent their pleas in higher institutional levels (state, and national) to bring external aid and resources to allow them to achieve their basic goals.

Municipal independence

The first strategic collective goal pursued by Neza residents was their emancipation from the municipality of Chimalhuacán. This collective goal was intended to build a responsive and accountable institutional framework to help Neza residents meet their basic collective goals (see Figure 17). The collective goal of a municipal independence has a simple explanation: Neza residents were not represented by existing institutions.

Figure 17. *Flyer published between 1959-1963 demanding for fresh water supply and municipal independence*

Note: Flyer reeds "Drinkable water! With free municipality. Executive Central Committee pro-independent municipality of the colonies of the former Texcoco lake."
Source: Expedientables nuevas adquisiciones [New acquisitions file] (1976)

> *Because this area was neglected... We were abandoned, we were on the edge of Chimalhuacán. And if there was no attention, then we wanted them to turn to see us… And that was it, to have* [municipal] *autonomy so that the services of the state government could be independently processed* [by us]. *That's why it came first [the independence of the municipality]. And the water, was in parallel, because it was necessary…* (A-717)

As it is possible to interpret from the previous quote, Neza residents needed institutions that effectively represented their interests, in order to achieve their basic collective goals. This was because they did not receive the benefits of being part of Chimalhuacán municipality, thus Neza residents felt abandoned by the institutions supposed to represent them. However, the order in the prioritisation of collective goals is difficult to discern from the interviews. While most participants provided answers that put together multiple basic goals in the same basket, they also mentioned the strategic goal of municipal independence at the same time, or even before basic goals. This is the case of the following extract, in which it is possible to interpret that Neza residents understood that meeting basic collective goals was only possible by overcoming institutional challenges through strategic goals.

> *The fundamental goals were, first the separation of Nezahualcóyotl, emancipating us from Chimalhuacán. The other, water. First drainage, water, and paved streets. […] Independent municipality, drainage, potable water, and paved streets. Those were the four main demands. (A-720)*

The importance of the independence of the municipality as a means to improve services can be seen in the following quote. While telling the story of how the name of the municipality was chosen, this interviewee stressed that how the municipality was going to be named was not a relevant matter, what mattered was the possibility of having a formal authority representing Neza's interests, able to produce the services and infrastructures needed:

> *They said that the city was going to be called Cuauhtémoc, […] I do not know what the story was... I did not really care about the name. What I wanted was services... (A-721)*

Land tenure

The second strategic goal was secure land tenure rights. It came to the forefront a few years after the achievement of the goal of municipal independence, as Neza residents realised that becoming an independent municipality did not necessarily gave them access to the resources they needed to meet their goals. Even the state authorities knew that given the magnitude of Neza's challenges, becoming an independent municipality was not enough for the development of the area. The following interview excerpt illustrates the opinion of the governor of the State of Mexico, at the time of Neza's municipal independence. According to one of the interviewees who participated in the negotiations for the achievement of an independent municipality, Governor Juan Fernández Albarrán expressed very low expectations for the future of the municipality.

Then we went with Juan Fernández Albarrán. After having several meetings with him, and the leaders raised what was happening in Nezahualcóyotl, the need to emancipate from Chimalhuacán… one day the governor says, "OK, you will have institutional life, I will push in the congress for [Neza] to become a municipality… But I will just tell you one thing, 100 years will pass and Nezahualcóyotl will never have the opportunity, in those 100 years, to become a dignified city in which you can live." (A-720)

This extract provides evidence of the low expectations that the governor had for the new municipality. It is also evidence that the governor knew that the achievement of an independent municipality alone, was not going to help Neza residents to meet their collective goals. Perhaps these low expectations were related to the control of Neza's government by external actors. According to most interviewees, it was widely known that the developers directly appointed who the mayor was going to be. Even when municipal authorities were elected, developers had the ability of deciding the names on the ballot. According to some interviewees36, this was possible due to a cooperative relation between developers and the state government. Furthermore, most interviewees considered that even when the collective action related to the independence of the municipality had a large social base, it was controlled by a reduced group aiming to control the future municipality. This opinion is exemplified in the following quote:

The people who participated [in the creation of the municipality], they had money. They were from another position [social class]. Only a few people created the municipality, they were a closed group, even relatives of the developers. (A-725)

Neza residents identified that the new municipality, far from helping them to achieve their collective goals, was instead being used to advance the agenda of the developers, whose only interest was securing their profits. Furthermore, the developers used the very forces of the municipality, such as the municipal police to enforce their unconscionable contracts. Thus, Neza residents realised that to be able to meet their collective goals, they needed to challenge the developers' source of power: the property of the land.

We suffered a lot from [the lack of access] to water and energy... Well, then the struggle began… The developers sold up to nine times the same lot. If you were late for a month or two months [in the payments], the lawyer would come to evict you, and sell [the lot] again. That's why we started the social revolt… (A-628)

The previous quote is an example of how early Neza residents realised that to meet their goals, it was first necessary to pursue a collective goal that challenged the status quo. In the previous excerpt, the interviewee referred to the collective goal as a social revolt, which indicates that they raised against the set of conditions that hindered the

36 Interviewees describing a cooperative relation between government and developers are: A-725, A-65, A-720, A-557, A-628, and C-723.

achievement of Neza's collective goals. In this case, it was the control of the ownership of the land, fraudulently-enforced by the same actors that controlled the municipality. By defying the control of the property of the land, Neza residents also defied the rule of unaccountable municipal authorities. This collective goal was finally met in 1974 as a result of a large revolt based on a payment strike, that forced state government to expropriate the land to the developers, and legally sell it back to Neza residents. The effect of this was the removal of the developers from the control of the municipality; which in turn led to more accountability on the part of the municipality in representing the interests of Neza residents.

5.2 Group formation: Common background, and the role of ethnicity

One of the features that appear to have facilitated the formation of groups in Neza, beyond shared challenges, is Neza inhabitants' common background. All early Neza residents were poor, or working class, most of them were rural migrants coming from diverse areas of the country, who were forced to migrate due to changing national economic policy. Finally, according to most of the interviewees, migrants that came from the south-eastern state of Oaxaca had a preponderant role in boosting collective actions due to culture-specific practices of Oaxacans. The combination of these features made that the early formation of Neza's groups happened among people sharing similar backgrounds. This resonates with the sources of bonding social capital, which emerges from the interaction of rather homogeneous social groups, creating strong intra community ties at the local scale (Grant, 2001; Rydin & Holman, 2004; Woolcock & Narayan, 2000).

The analysis of the interviews revealed that most interviewees identified themselves as poor migrants that arrived to Neza seeking for better opportunities in life. According to Putnam (2007), ethnic diversity is an obstacle for the emergence of trust and reciprocity However in Neza, even when migrants came from every part of the country, solidarity emerged between them despite their differences. Solidarity emerged as early Neza residents identified each other as poor, and sharing the same challenging conditions. Most interviewees associated their commonalities in background and interests (collective challenges and goals) with the emergence of solidarity groups.

> *Here everyone who arrived, 95% if not more, were working class people, not privileged at all. We are all humble people, poor people who came to make our rooms of cardboard, and hollow-bricks on the bare ground. […] We all came under those conditions. (A-712)*

> *We were the poorest. The ones with no money nor good jobs. Our husbands were workmen… they were not government employees or anything like that, they were… how to say it? ... They were minimum-wage workers. That's the kind of people that arrived here and built Nezahualcóyotl. (A-725)*

Most of us were labourers, people with no studies, workmen, or small businessmen… (A-718)

I'm telling you, unity was fundamental. We were all humble, poor. There were no ambitions, but there was solidarity for the town to grow. People wanted education, hospitals. Everything! everything! We were really in a bad situation. The people, everyone.... I arrived in [19]57, and to be honest I remember very well how Neza improved, with [the work of] its humble people. People who really did not have the means, not even for transportation. That is when solidarity comes. (A-710)

From these quotes, it is possible to see that Neza residents were very similar to each other in terms of socio-economic backgrounds. And given that in the municipality there were no infrastructures nor urban services, there were no conditions for the community to develop. Thus, Neza residents were forced to draw on the solidarity of groups of humble people, whose collective work helped improve the settlement over time.

In addition to poverty and the shared needs among Neza residents that constituted the base for the integration of solidarity groups, ethnicity seems to have played a fundamental role in boosting collective action. As stated earlier, migrants who arrived to Neza came from several parts of the country, but the largest group of migrant population (nearly 60% of it) came from only four states: Michoacán (17.2%), Guanajuato (15.3%), Oaxaca (13.3%), and Puebla (12.8%) (Secretaría de Industria y Comercio, 1971) (see Chapter 3). Among the main migrant groups that arrived to Neza, Oaxaca migrants are identified by multiple interview sources (A-65, A-712, A-718, A-735, A-414, C-423, A-719, A-628, A-716, and A-668) as being instrumental to the organisation of collective action to the point that they considered the group of Oaxacans to be the largest of all migrant groups. However, as census data proves, Oaxacans were the third largest population among migrants in Neza. Despite this, it is remarkable that interviewees considered Oaxacans as being the largest of all groups. Perhaps, this perception is influenced by a disproportionate participation of Oaxacans, over other migrant groups in collective activities.

…It was difficult but not impossible, we wanted to build a city of hard working people, people that today would have the means to support themselves, and be better off… Not like us, that came from different parts of the republic… Here the largest group is from Oaxaca. I am from Oaxaca, 75% of us are from Oaxaca. Coming second are people from Guerrero, Veracruz, State of Mexico, and Tlaxcala. From every state, and even from other countries… (A-725)

One of the ethnic groups that arrived to Nezahualcóyotl were the Oaxacans. And well, they came from everywhere, it is a mosaic of national cultures. But Oaxacans were the majority. They came from Puebla, Michoacán, Jalisco… But the majority were Oaxacans. (C-423)

The majority of the people who arrived to Neza, 90% or maybe more came from other states […] I am from Oaxaca State. Back then the majority were from Oaxaca. Nowadays they say that it is no longer the case, that today most people are from the State of Mexico… But back then, more than 40% were from Oaxaca, followed by Guanajuato. I don't remember the order of importance of the people that arrived here, but I do remember that Oaxaca was the first. (A-718)

There was no energy. There was no security. [So, what I did was to call my neighbours to organise.] "Hey neighbour! Hey!" Some happened to be my fellow countrymen. The majority turned out to be from Oaxaca. From different parts of Oaxaca. One lived there, another there, another here, another there. And we got together. And when we began to see the issue of the newspaper that this land did not belong to the developers who sold it, we said: "Oh, man! And now, what do we do?" (A-65)

… Oaxacans are the ones that united the most. I don't know why, but the ones who arrived from there… Since we were there, in our land [Oaxaca], we were united… we arrived here and found each other… (A-65)

Researcher: I have been told that many leaders were Oaxacans…

Interviewee: You're spot on! Nezahualcóyotl is a mosaic of regions, but the majority of leaders were from Oaxaca. (A-716)

As it is possible to observe in the previous quotes, common ethnicity, and in specific being from Oaxaca, helped the formation of early groups. Also, these early groups helped to disseminate the necessary information across the community to boost collective action. The people from Oaxaca shared a culturally-embedded practice of collective organisation and voluntary work called Tequio.37 Tequio is community-based labour projects (J. H. Cohen, 1999), which according to the interviewees was relevant for the organisation of collective action in the municipality. Thus, boosting collective action was facilitated by the culturally embedded practice of Tequio. The following interview excerpts exemplify this:

Researcher: Why did you work collectively?

Interviewee: Because it was the best way to work. Usually, we, the people who came from the countryside, we have an idea of community support. In Oaxaca we call it Tequio. And that was what helped a lot of us here. Elsewhere, in other states they call it community work, or tasks. But in Oaxaca, we call it Tequio. And here [in Neza] as we are mostly people from Oaxaca, [we used to do] Tequio. If we

37 Tequio is a Nahuatl word that refers to the community work done by adult members of a given community. Its origin backs to colonial times (1492-1810) in which Dominican and Augustinian religious orders organised indigenous labour in benefit of their temples. Tequio has been preserved to this day as a moral obligation for people from Oaxaca. (Flores Quintero, 2004)

cooperated to donate hours [of labour] in our towns, why wouldn't we cooperate for our streets [here]? That was a big influence for the inhabitants of Neza. In our towns of origin, Tequio is what you have to do as community work without any payment, to build for example a school. If our village couldn't get money from the government, or from other countrymen, to buy the materials, in this case those who were living here [in Neza], we would collect the money and send it back to buy the materials. Once they got the material, they had to organise the work. The work was done by the inhabitants of that community in the town. A school, a church, repair a classroom, the town hall. Well that was [the role] of the inhabitant who was there, who couldn't give money, but who could give his workforce and his knowledge. That is called Tequio: without payment. (A-718)

Tequio was present at different scales of collective action in Neza. From collective labour to build a house and repair the streets, to the organisation of larger groups of neighbours, and the construction of extra-community ties. Examples of different forms of Tequio are present in several of the interviews conducted for this research. However, most of the interviewees referring to it did it by taking examples of activities organised by locally based groups (i.e. street, and neighbourhood scales) (i.e. groups of bonding social capital). One example of this is the following description of the solidarity labour of neighbours in times of stress:

Well, there was a very close relationship [among neighbours]. Because we needed everything, we supported each other. If the wind ripped off the neighbour's cardboard roof, we all went to help. Because then, when something happened to us, all the neighbours came [to help us] too. It was some kind of, as they call it in Oaxaca, Tequio. We helped each other. (A-712)

However, there is also another subgroup of respondents, who describe the activities of Tequio groups in terms that can be interpreted as bridging, and linking social capitals. This subgroup is smaller, but their understanding of what it means to do Tequio is more sophisticated, as it involves not only physical labour, but the participation and engagement in political actions. From the following extract, it is possible to identify that for the interviewee, the actions of Neza's groups that helped in to the development of the settlement resulted from a large-scale solidary collective action.

The restoration movement gave automatically its Tequio in the movement itself. Participating. Painting. Running errands in Texcoco, in Toluca [the capital of the State of Mexico]. A commission for this or that. We did it as if we were giving our Tequio. Where, to what purpose? To a town called Nezahualcóyotl. That's why we, the people from Oaxaca, say that Nezahualcóyotl is our town. (A-65)

The effects of Tequio for the community extended beyond the groups of Oaxaca people. Some interviewees who were not from Oaxaca learnt how to do voluntary work by observing and engaging with Tequio activities. An example of this is the experience of participant A-444, who, in the 1960s was a teenager from Mexico City who had just arrived to Neza. He started to participate in community activities by following the example of one of his neighbours, who invited him to participate in Tequio activities.

> *How did I learn to do Tequio? Seeing my neighbours. There were several from the same town […]. By seeing them, because we came along with them. On Sundays they organised themselves to build the ditches so that the water would not get stuck. When you see all that as a city-boy… "How much are they going to pay you?" you think. You come on and help, because I was known by my neighbour. And there I learnt to do the famous Tequio. (A-414)*

This kind of social learning extended across the municipality. According to C-423, who was a community leader during the 1970s, and then became Mayor of the municipality, the presence of people from Oaxaca played a major role in Neza. This is it because the process of social learning of community engagement that happened across the municipality served to boost citizen engagement across the municipality.

> *Researcher: How did the predominance of Oaxaca people influence the local organisation?*
>
> *Interviewee: Very positively. Very positively... Because they are very participative people. They are people who are very used to do citizen participation. On the construction sites, with labour. And that helped us a lot, because they were a pivot, a magnet, a driver for all the other communities to participate. (C-423)*

It is interesting that the presence of a single group of rather cohesive people, driven by ethnicity, in a rather diverse context, boosted a process of social learning towards citizen engagement and participation in community activities. Also, it is to be noted that even when early Neza settlers were rural migrants, they used their culturally embedded knowledge to develop a city. This means that even when Oaxaca people used Tequio in rural activities in their places of origin, what is important is the capacity of organisation and engagement regardless of the context. As observed by Murphy (2002) while referring to the work of J. H. Cohen (1999) on cooperation in a town of Oaxaca: *"…the author demonstrates that cooperation among individuals and families is part of a complex system in which the community reinvents its identity according to changing socio-political and socio-economic contexts."* (Murphy, 2002)

Thus, the adaptability of these culturally-embedded behaviours, and their capacity to be spread beyond ethnic boundaries, could be one of the keys to explain Neza's promptness for collective action, and a source of Neza's resilience.

5.3 The pursuit of strategic collective goals, and the role of politics

The interview data sheds light on the formation of the groups that participated in the achievement of the collective goals used in this thesis to explore Neza's resilience. This subsection describes how network participants gathered around strategic collective goals (municipal independence, and land tenure), and identifies the role of politics in the group formation. Interview data suggest that Neza's groups, at moments of the pursuit of strategic collective goals gathered participants as follows: groups formed at the street or neighbourhood levels (i.e. bonding social capital), and then these groups coalesced with each other (i.e. bridging social capital), which then served as generators of relations with people in positions of power (i.e. linking social capital). Ties with people in positions of power (i.e. linking social capital) were facilitated by the affiliation of members of the group to the PRI political party.

Municipal independence

The first strategic collective goal pursuit by Neza 's groups was that of municipal independence. This section describes how participants gathered around the collective goal of municipal independence. According to interview sources, collective actions that lead to the independence of the municipality were forwarded by Neza's residents in the form of a social movement called the Union of Forces. Although the achievement of municipal independence is one of the key collective goals of Neza's network, and that its achievement involved a large engagement of Neza residents, only few interviewees actually participated in network actions at the time. This is because network actions towards the independence of the municipality happened more than 50 years ago (1959-1963). Thus, only the general operation of the network is identified in the interviews conducted during the fieldwork of this research. This information was collected relying on a reduced number of interviewees (A-183, C-423, A-628, A-708, and A-725) that participated in the network at the moment of the pursuit of the collective goal of municipal independence, however, leaders of the network were not reached.

According to the reduced number of interviewees who participated in the operations of the group at this moment, the Union of Forces was formed, mainly, by a coalition of groups of merchants and neighbourhood organisations advocating for the independence of Neza. According to the interviewees, neighbourhood organisations were formed by small groups (i.e. bonding social capital), which joined with other similar groups, sharing the objective of making a new municipality. A-708, who participated in the movement of the Union of Forces, and was one of the leaders of the merchants, recalls that the first actions were done by the merchants and then the organisations of united neighbours .

The Union of Forces was constituted in this way… First it was formed the United Front of Merchants. And when they saw the hustle, the leaders of the colonies began to adhere, or to join the United Front of Merchants. Because they saw that the movement was strong. […] Then, they began to join forces, and it was then that the Union of Forces was made. (A-708)

However, the boundaries between neighbours and merchant organisations is rather blurry, as merchants were also Neza neighbours. For this reason, most of the interviewees only recall that the Union of the Forces was integrated by a coalition of neighbours' organisations.

Well, there was a group called the Union of Forces. They were citizen representatives of the various colonies, which were neighbours' unions. Each colony had a union of neighbours that were called as committees of settlers, and between all of them, they formed [the Union of Forces]. It is like the Mexican Republic, all the states united and formed the United Mexican States. Here all the colonies unified and formed the group of the Union of Forces, whose objective was essentially to achieve that the colonies of the former Texcoco-lake, which was its name at that time, could achieve their independence, and form a new municipality. (C-423)

The pursuit of the collective goal of municipal independence shares a similar organisational structure with the pursuit of the other strategic collective goal analysed in this sub-section: secure land tenure rights. The network was divided into small committees, which served to transmit information across the network about collectively agreed actions. They also collected signatures to support the petitions made by group members, which were then delivered to government actors. In the following interview excerpt, the procedure followed by members of the group to disseminate information, coordinate, and take actions, from the neighbourhood level to reach the government is mentioned:

Settlers' unions were made at the neighbourhood level […]. Committees were formed, and those committees […] went to the government. (A-183)

Evidence of this was also found in the analysis of the documents collected during the archive stage of the research. Analysed documents suggest that the Union of the Forces was led by an executive committee that represented Neza neighbours. All the communication of the network in form of community petitions to actors of the government was mediated by the executive committee, while petitions were backed up with the signatures collected by the smaller, on-the-ground committees. This is evidence of the existence of a small group of leaders that mobilised and controlled the collective action in a top-down fashion. Unlike the group working towards land tenure, respondents tend to recall that the leaders of the Union of Forces were not necessarily forwarding the agenda of the grass-roots, but rather theirs. Specifically, interviewees considered that the pursuit of municipal independence was a mechanism to open positions of power for the leaders of

the movement (see page 127 for A-725 quote). A-725, who was not part of the Union of the Forces, but was part of the land tenure movement, recalls that the difference between movements was the type of actors who were the leaders of both organisations. On the one hand, she perceived that the leaders of the land tenure movement were part of the community, while those of the Union of the Forces were different to them.

This poses the question of whether the objectives of the leadership of the Union of the Forces were to advocate for the achievement of Neza's collective goals, or to further their own agendas. There are also interviewees who suggest that even when a new municipality was formed, the rest of the collective goals remained unresolved.

> *As I'm telling you, it is easy to have a child and not to raise her. Well, many did this. They fought for the municipality to be created, but they left as it was, without services or anything. They did not fight for the services afterwards. Thus, this is why we [the Settlers Restoration Movement] fought for. When we got land tenure rights, and the people started to get credits, we started to have furniture shops, banks started to appear, and all the retail shops started to come… (A-628)*

The previous quote suggests that the mere achievement of Neza as an independent municipality was not enough to meet the rest of the collective goals of Neza's residents (i.e. basic collective goals). In the quote, interviewee A-628 consider that this was caused by the sudden disengagement of those who participated in the municipal independence movement and believed that achieving it was enough to get political representation to seek for the solution of the challenges faced in the municipality. Considering the context earlier described, in which a small group ended-up controlling the municipality to fulfil their own agenda, over the interests of Neza's residents, A-628's quote suggests that this happened because the disengagement of the people that initially forwarded the goal of municipal independence. Furthermore, according to A-628, this is why Neza residents had to engage in a new movement to achieve secure land tenure rights, which in turn allowed the achievement of basic collective goals.

This subsection described how the strategic collective goal of municipal independence gathered participants across Neza, and how it scaled up to reach government actors to forward the achievement of municipal independence. First, groups were formed at the street, and neighbourhood scales. Then, these groups joined forces with other neighbourhood groups into a large-scale organisation, which served to reach extra-community actors in government positions able to help in the achievement of the strategic collective goal of municipal independence. However, the sole achievement of municipal independence did not result in the achievement of basic collective goals. This lead to the need of another movement seeking for the achievement of secure land tenure rights. The secure land tenure rights movement is analysed in the following sub-section.

Secure land tenure rights

It is widely acknowledged by the participants of this research, that the collective goal of secure land tenure was pursued by a grass-roots movement named the Settlers Restoration Movement (SRM). Relying on the answers of the interviewees, it is possible to state that SRM operated in two distinctive complementary tiers. First, SRM was integrated at the bottom of its operation by small street or neighbourhood groups (i.e. groups of bonding social capital), integrated as committees. The second tier of the network was called the Council of the Settlers Restoration Movement (CSRM). CSRM was integrated by all the presidents of the committees (i.e. bridging social capital). CSRM also had a leadership, which according to the archives, was structured by a president, a secretary, a spokesperson, and a treasurer.

This differentiation of tiers in the network was one of the strategies employed by its participants to facilitate its operation. Interviewee A-65 explained that in one of his trips to his home town in Oaxaca, he witnessed the transition of powers of the municipal administration, and that the structure of the new government was that of a general assembly with an executive council. He proposed this model to the CSRM, which was accepted. This transition is acknowledged by most of the participants of this research:

> *58 colonies were made. Those 58 colonies were united. In each colony there was a president of the restoration movement. That's how we called it: Council of the Restoration Movement. At first it was only the restoration movement. Then it was the Council of the Restoration Movement. (A-725)*

The two tiers of the movement had distinctive operative roles. The first tier operated as follows. Each of the committees had a leadership, in the form of president of the committee. The function of the committees was to collect, discuss and agree on what were the main problems of the community. Once an agreement was reached, the president of each of the committees would raise her committee's problematic to the second tier of the network.

> *Everyone was in charge of something… Each committee president was responsible for asking and raising the most important issue affecting her colony. And then, the council took note of everyone's input, and we programmed the activities to fix the issues at hand. (A-65)*

The role of the second tier (CSRM), was to collect neighbourhood committees' general problematics, discuss them and define appropriate actions to tackle them. Also, the leadership of the CSRM was in charge of reaching for extra-community aid when issues exceeded the capacity of the network to tackle the problematic of the community.

First, in each colony there were committees that organised assemblies. There were 3, 4, 5 committees in each colony. They met every week, discussed the problem and took it to the central committee of the Restoration Council. They were then processed and, if needed, the central committee took them to the state government or the federal government. (A-720)

Information was transmitted in two directions: bottom-up and top-down. Information gathered at the bottom of the network was discussed, and issues were prioritised. The most relevant issues were then raised to the council where agreements were reached on the strategies necessary to tackle the identified issues. Then, the rest of the network was informed in a top-down fashion about the strategies. As it was possible to see, the movement that forwarded the strategic collective goal of secure land tenure rights, shared some similarities with the movement that forwarded the independence of the municipality. Both movements were organised from the bottom to the top, relying on the coalition of street, and neighbourhood groups coordinated by a group of leaders. The difference between both movements, is that it operated with two tiers of leadership, one grouping neighbourhood representatives, and the other, a smaller group of the general leaders of the movement. The latter was the one responsible of making more strategic decisions, and contacting with extra-community actors.

PRI party in the operation of Neza's groups

This section describes the dual affiliation of some Neza residents that participated in actions for the achievement of Neza's collective goals. Some Neza residents were members of the PRI political party, and at the same time with community organisations. The magnitude of the presence of PRI members in Neza's community organisations was such that it is difficult to distinguish the differences between the two affiliates. (This is indeed one finding of Chapter 6: only one social network was identified as being responsible of forwarding Neza's collective goals). Rather, it seems that the operation of Neza's community organisations was highly integrated to the PRI party, or vice versa. Neza's community organisations indeed was highly politicised, and two distinctive objectives were pursued through the politicisation of the community organisation. On the one hand, the PRI party aimed to secure the political control of the municipality; and on the other, Neza residents participating in the group used their political participation as a strategy to advance their collective goals.

The operation of the PRI party con be theoretically described as relying in the formation of Neza's groups through bonding, bridging and linking social capitals. The main objective of the PRI party was the control of political power through the use of strategies of transactional politics, converting social capital into political capital. Even when references to the action of PRI networks is present in all the interviews, detailed information on its operation was provided by only a handful of respondents. PRI networks relied on the grass-roots to gather supporters to the party. First, street level PRI volunteers

gathered their neighbours into small committees that represented electoral districts. They used these committees to collect information about the needs of the population, which then was used as campaign promises by political candidates in elections, and thus to gain popular support for the party. Information about these operations was provided mainly by interview respondents who had held public office. The following quote is part of the interview to a community leader (C-423) who was a PRI mayor of Neza in the 1980s. According to him, there was a strategy of the party to have supporters on the ground. This strategy is very well known for all Mexicans, and extensive research has been conducted on it (Bassols Ricárdez & Espinosa Castillo, 2011; Pacheco Méndez, 1991; Selee, 2011; Tosoni, 2007).

> *Assemblies were organised, we invited the neighbours to participate in the assemblies, and we asked whether someone wanted to represent the PRI in that sectional committee. It is like a small PRI. A PRI that is in direct contact with the citizenship. It is formed with the same citizens of that place. From the same electoral section.* […] *There is a wide diversity in sectional committees, there are committees that are integrated by 5 blocks, 10 blocks, 8 blocks. According to the size of the constituency. There are blocks that are rather small, they have a small* [constituency]*, then their spatial reach is bigger. And when there is a big density,* [their spatial reach] *is reduced, because a lot of people live in those blocks, in that district. (C-423)*

Despite the fact that PRI networks had electoral objectives, they remained active at all times. According to A-717, who was a community leader, member of sectional committees and merchants' organisations, and also in the 1980s was member of the federal congress representing Neza; sectional committees remained active due to the long term need for public services. This could mean that the PRI had identified that the magnitude of the challenges of Neza could be used to sustain the political networks in the long term. Also, as he mentions, as members of sectional committees were more identified with street or neighbourhood leaders, this could mean that the party relied on strong networks of reciprocity to secure electoral results. Because street leaders were the ones who convinced their neighbours to vote for the PRI in exchange for infrastructure, its delivery once in power could be easily transacted into votes in future elections due to the close relationship among members of the committee, which might help to remind network participants about the reciprocity they owed to the political party.

> *The sectional committees were groups of neighbours that were united for electoral purposes. But they kept active due to the constant need for public services. Back then, the only political party that existed was the Institutional Revolutionary Party. [Members of the sectional committees] were part of the party, but they were more identified with neighbourhood or street leaders. (A-717)*

Back then I was president of the block. It was a long time ago… [As president of the block] I visited my neighbours to talk about their needs. And to motivate them to organise to get public services. […] Then [the different presidents of streets and neighbours] used to meet. In our meetings, we used to discuss proposals, concerns and opinions… Agreements were taken to be raised as a whole. (A-709)

Figure 18. *PRI committee handing out construction materials to its members*

Source: Trabajos efectuados en la colonia del Sol por CEAS durante las inundaciones en el municipio de Ciudad Nezahualcóyotl [Works carried out in the el Sun colony by CEAS during the floods in the municipality of Nezahualcóyotl City] (1982)

Similar to the operation of the network at times of the pursuit of secure land tenure rights, PRI networks also had a multiple tier organisation system. And similarly, PRI networks used these tiers to facilitate the flow of information across the network. Neighbours benefitted from it as it facilitated them raising their concerns to the government. Also, networks were used to facilitate the mobilisation of large collective actions to demonstrate the popular support of a given goal; which of course then was transacted into votes if the goal was delivered.

The sectional committees of the party [which operated at the neighbourhood level] had a leader, […] through them, invitations to participate, for example, in massive events were sent to the people. But the formal negotiations are done through formal petitions, and are done by the representation of the leadership. The leadership goes and negotiates, and when it is necessary, between quotation marks, puts together a large demonstration to show the strength and the value of a petition. To prove that the petition was backed by a large number of people.

Information goes up-wards and down-wards through the assemblies. It is sort of a pyramid. At the base they take agreements, these go to the second, third tiers, until it reaches the top. And the top of the pyramid takes it up to the different branches of government. And in the same way it goes down-wards up to the bottom. (C-423)

Most interviewees, regardless of having participated in sectional PRI committees, recognised the importance of the PRI. Given that PRI was virtually the only political party that existed in Mexico for a long time (1920s – 1980s), being part of it facilitated the negotiations of public concerns. Thus, participating in PRI networks was a mechanism used to build ties with people in positions of political power (i.e. linking social capital) to advance their social concerns.

Something that was like the cement for the organisations was the PRI. Because, back then, there were no other political parties. Of course, it was a different Mexico. […] *The PRI was the cement that held together and drove all the social struggles. (C-714)*

Researcher: Why was the group part of the PRI party?

Interviewee: Look, I think it was a matter of convenience […]*. It was convenient because this allowed a relation between the government and the organised civil society. (A-720)*

The contacts that we used to have were PRI ones. […] *Back then we used to organise with them, on the one hand we had our local [neighbour's] committee, and on the other we had our PRI logo. We worked on that* [the PRI]*, and they helped us, they gave us advice, they helped us to sort our issues.* […] *It was mutually beneficial for us and them* [the PRI party]*. We helped them, and they supported us to solve our problems. (A-719)*

The previous quotes illustrate a close relation between the PRI party and Neza's community organisations, which was mutually beneficial for both sides. On the one hand, the PRI party benefitted from Neza's groups to secure political support in exchange of mobilising resources for the solution of Neza's collective goals from government positions. On the other hand, Neza's community organisations used PRI contacts to build ties with people in positions of power (i.e. linking social capital) to advance the collective goals of Neza's community organisations.

5.4 Concluding remarks on Neza's groups formation

This chapter has presented the formation of Neza's groups of social capital based on the analysis of interview data collected on the field. The main contribution of this chapter is the identification of collectively defined goals as the starting points of community engagement, and of the mechanisms that early Neza residents used to facilitate

collaboration with social actors at the local scale and beyond to achieve their community objectives. The first finding that provides information about the formation of groups of social capital is the interpretation of early Neza residents of the environmentally and institutionally challenging context that they faced as a shared situation. This challenging context rendered the area inhospitable for urbanisation, and pushed early Neza residents to collectively seek for solutions. Collectively identified solutions functioned as starting points for the emergence of solidarity and community engagement in the area. That is, community engagement in Neza had the objective of achieving solutions to the challenges offered by the context. As explained in Chapter 2, achieving certain goals through community engagement is one of the defining characteristics of social capital (James S. Coleman, 1988). As such, the identification of collective goals as starting points for the formation of social groups supports the idea that Neza's community engagement can be explained through the theoretical lens of social capital.

The second finding of the chapter refers to the characteristics of the collective goals that gathered the engagement of early Neza residents. Two different types of goals were pursued by Neza residents. The first type of goals focused on the achievement of urban infrastructures in the area. The second type of goals aimed to revert failures of the institutional framework that hampered Neza residents in the achievement of their collectively defined goals. As such, the first type of goals is conceptualised in this thesis as basic collective goals, and the second as strategic collective goals. This chapter also demonstrates that interviewees themselves framed their collective goals as basic and strategic. From the interviews analysed in this chapter, it was found that some goals were used as means to achieve other goals. That is, findings of this chapter suggest that the productive purpose of social capital was used in Neza as a multiplicative mechanism to support the achievement of further objectives.

The third finding of this chapter sheds light on the social features shared by early Neza residents that facilitated the formation of groups of social capital at the interior of the community. The characteristics of the population of early Neza residents was of a great ethnic diversity. According to some social capital theorists (Grant, 2001; Rydin & Holman, 2004; Woolcock & Narayan, 2000), the formation of groups of social capital at the local scale is facilitated by the commonalities shared by group members, including ethnicity. As such, the formation of groups of social capital in an ethnically diverse context was facilitated by other commonalities shared across the community, that is, the disadvantaged position in which all Neza residents found themselves as being poor rural-urban migrants, facing the same set of challenging conditions (environmental and institutional). That is, the sum of the shared challenging conditions, and their similar socio-economic background helped early Neza residents to bridge their differences, and provided the basis for their mutual support and collective engagement. Findings of this chapter also show that ethnic diversity played another positive role in the formation of groups of social capital. Oaxacans, the largest group of migrants in Neza (as identified by

interview sources, but in contrast to census data), and their culturally-embedded practices of community work (Tequio), facilitated the formation of groups of social capital in Neza. Active engagement of Oaxacans in community work as a collaborative process beyond ethnic boundaries, helped to disseminate the idea of collaboration across Neza, which in turn facilitated the formation of groups of bonding and bridging social capital.

The fourth finding of this chapter relates to the formation of extra-community ties of collaboration between Neza residents and government actors (linking social capital). The formation of ties of collaboration between Neza residents, and government actors was achieved through two main processes. First, the formation of groups of social capital in Neza occurred in a scale-up fashion. That is, small local groups of bonding social capital joined to each other, forming large community organisations of bridging social capital, which in turn served to create social pressure that allowed Neza residents to reach for government attention. The scaling-up of social capital allowed the transmission of information across group participants top-down, and bottom-up, this facilitated the coordination between participants in the definition of collective priorities, and actions to be taken. Second, some of the early Neza residents affiliated themselves to the PRI political party to facilitate access to government actors. Mexico at the time had a political system of a single party (PRI); thus, being affiliated to the PRI party facilitated the contact to government actors. Furthermore, the operation of the PRI party resembled that of Neza's groups of social capital, in the sense that the PRI structure relied on small street level committees, joined together by a municipal structure, linked to the state and national leadership. Findings of this chapter suggest that the affiliation of Neza residents was parallel in both organisations. This parallel affiliation allowed Neza residents to advance their local agenda by collaborating with extra-community actors. This collaboration was mutually beneficial, as government actors secured the political control of Neza, while Neza residents advanced the achievement of their collective goals.

In sum, this chapter has located the starting points of collective action in Neza, as well as the social features that facilitated intra- and extra-community collaboration for the achievement of the collective goals of early Neza residents. This chapter argued that the emergence of groups of social capital was the result of the interpretation of the challenging context in which Neza residents found themselves as a problem that had to be faced collectively. The formation of groups to solve the challenges experienced by early Neza residents was facilitated by their similar socio-economic back ground, the active engagement of Oaxacans through their ethnic-specific practices, and the political participation of some early Neza residents. The following chapter presents the group of participants who engaged in the achievement of the collective goals of early Neza residents as a social network integrated by 706 actors.

6. The social network of Neza's resilience

This thesis seeks to understand the role of networks of social capital in the urban resilience of self-help settlements using Neza as a case-study. The previous chapter discussed the formation of groups of social capital as mechanisms to solve the challenging conditions in which early Neza residents found themselves. The main objective of this chapter is to present evidence of the existence of a social network in which its participants worked collectively in the achievement of the collective goals of Neza's early residents. Findings of this chapter serve as the starting point for the investigation of the structure of social capital in the context of the resilience of Neza (the structure of the network is the topic of section 7.1). This chapter thus contributes to answer the sub-question 'What network structure supports the operation of social capital for the resilience of self-help settlements?'. To answer this sub-question, evidence collected during archive-mining is analysed using social network analysis. The key argument of this chapter is that the sustained interaction between actors in the context of the achievement of the collective goals formed a pattern of interactions that can be analysed as a social network. This chapter is divided in four parts. The first one, (Section 6.1) is dedicated to the identification of the social network that operated in Neza associated with the collective goals discussed in Chapter 3 (water supply, drainage, public transport, paved streets, municipal independence, and secure land tenure rights) as responses to the environmental and institutional challenges that the settlement faced. The second part of the chapter provides evidence on the longitudinal nature of the social network across time (the period of network data observed in this investigation is from 1953 to 1986). The third part of this chapter (6.3) focuses on understanding how the identified social network was sustained through time. The fourth and final part of this chapter tracks the evolution of the achievement of the collective goals of network participants.

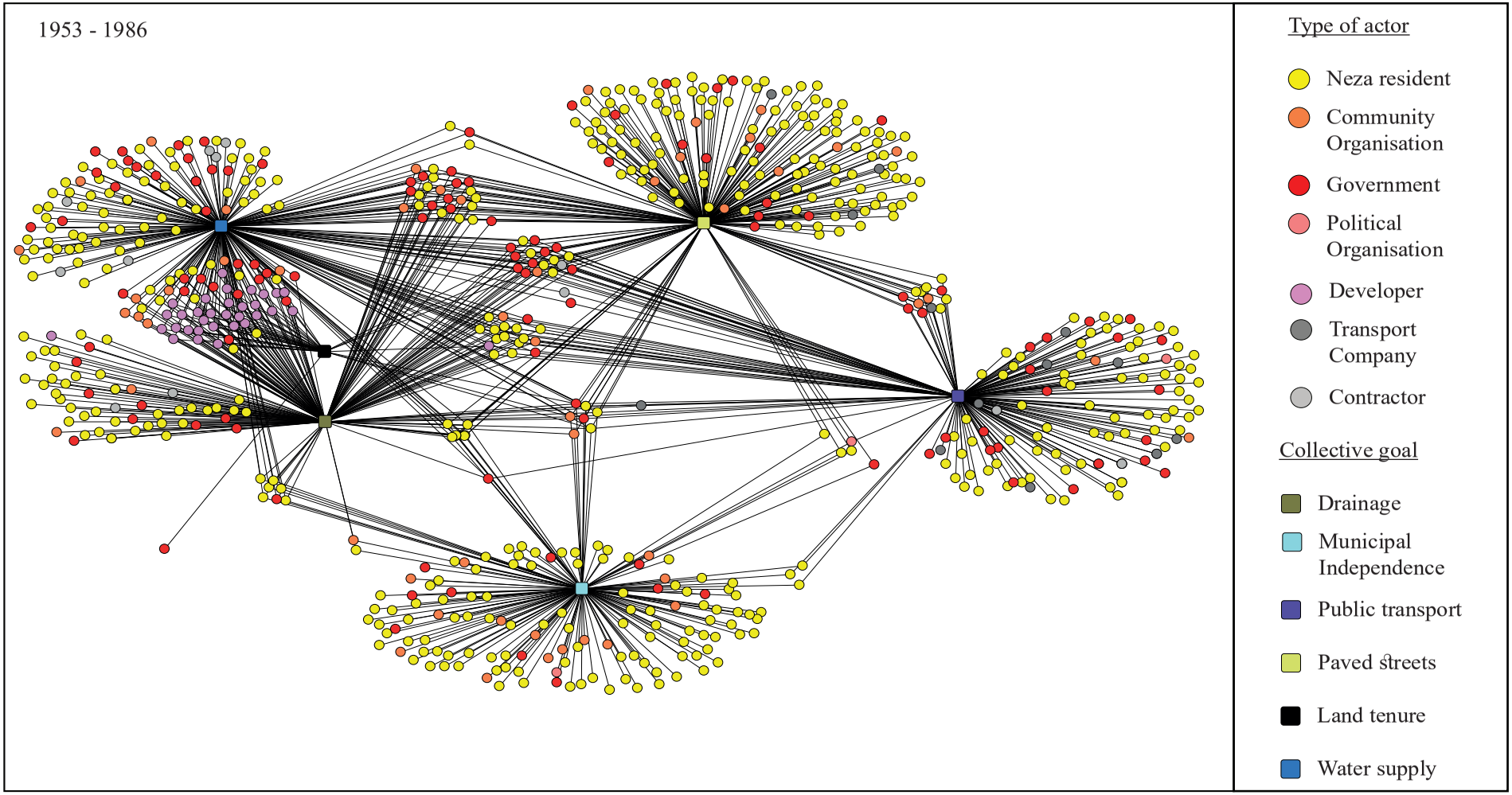
6.1 Neza's social network

This subsection identifies the social network that emerged from the sustained interaction of actors around Neza's collective goals during the period of 1953 – 1986. The identification of the social network relies on the documents investigated during the archive mining stage of fieldwork, which were recorded and processed using the methods of social network analysis (SNA). Here, it is useful to bring back some relevant points explained in Chapter 3 about SNA to facilitate the understanding of this chapter. The analysis of network data in SNA can process multiple types of relational information, out of them two are used in this thesis. These are the relations between two equal sets of data (i.e. actors to actors) (one-mode networks), and relations between two different sets of data (i.e. actors to collective goals) (two-mode networks). Also, through SNA it is possible to transform two-mode networks into one-mode ones. That is, from the original data of relations between actors and embedded units of analysis (two-mode), it is possi-

ble to obtain relational data of actors to actors, linked together by their co participation in the same collective goals; and the relations of collective goals to collective goals, tied together by the co-participation of actors in different collective goals. Data analysed in this chapter was originally recorded as two-mode (i.e. actors to collective goals), as the relation between actors and collective goals was collected through the participation of actors in documents about the collective goals investigated in this thesis. The original two-mode network (actors by collective goals), was transformed into one mode networks (actors by actors, and collective goals by collective goals). Both types of network data are used in this chapter.

When the relations between actors and collective goals (two-mode network) are graphed (Figure 19) a single social network is detected, rather than six goal-specific independent networks. This means that all Neza's collective goals were connected to each other by some actors that participated in more than one collective goal This shows that the achievement of collective goals was forwarded by the coordinated co-participation of actors in different collective goals (this is explored in more detail later in this chapter). Furthermore, the interconnected pursuit of collective goals shows that the research design of this thesis (single case-study with multiple embedded units of analysis) is appropriate, as all the investigated collective goals contribute in an interrelated way to the overall case-study. It is interesting to note that actors who participated in multiple collective goals represent only 24.8% (175) of the actors present in the network (706); while the majority of actors (75.2%) participated in only one of the researched collective goals. Participation in multiple collective goals suggests that some actors considered that the advancement of the community depended on achieving multiple goals, as they are interrelated. And also, from a connectionist perspective (Stephen P. Borgatti & Foster, 2003), those actors might have served as conduits of information across different sectors of the network, allowing the coordination between actors in the achievement of collective goals. On the contrary, single collective goal participation suggests that for those actors, the collective goal in which they participated was the most important one at the moment of network participants' engagement.

Figure 19. *Neza's two-mode social network, actors by collective goals (1953 – 1986)*



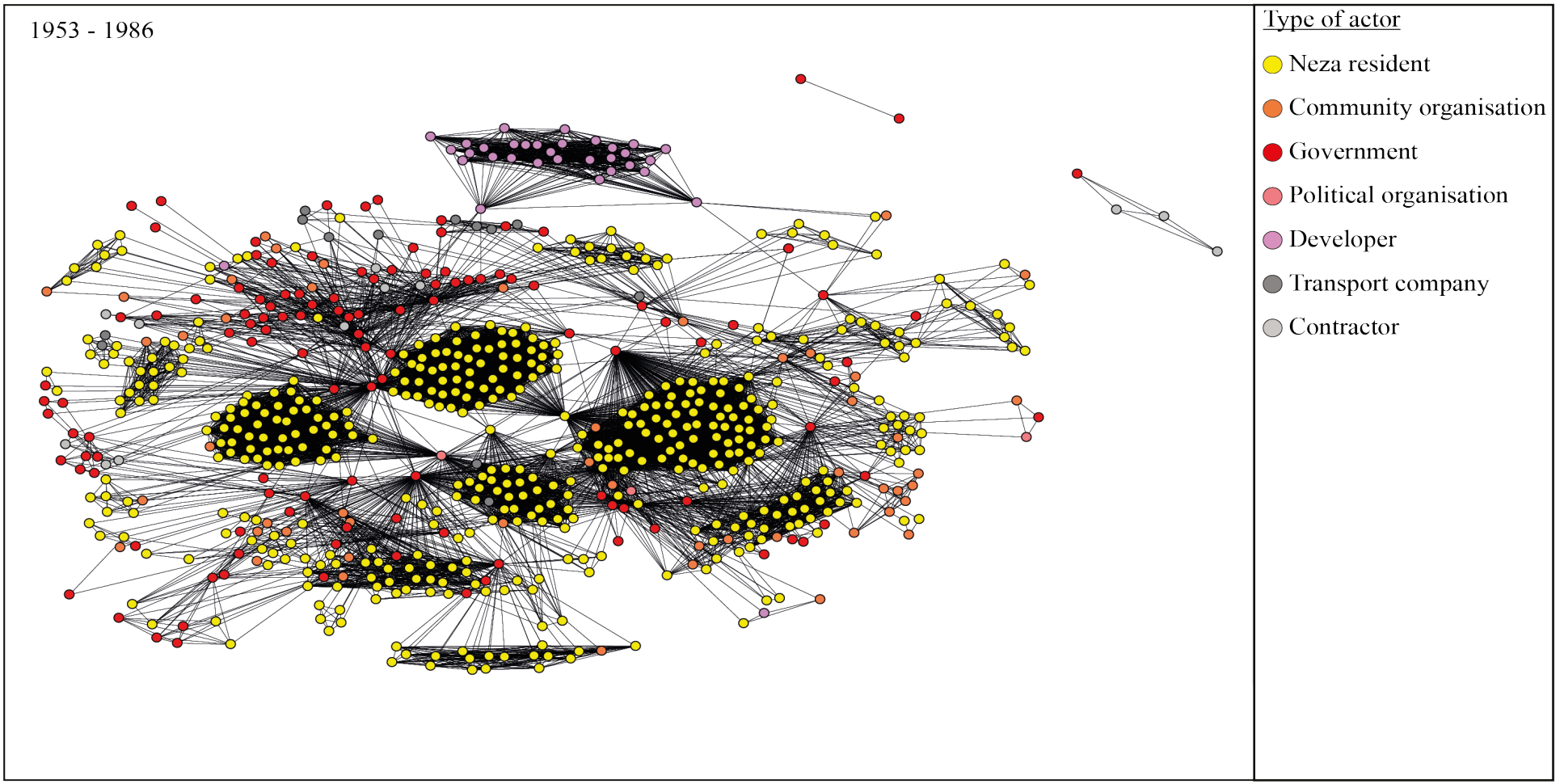
Source: Author's elaboration.

When the network of actors by collective goals previously described is transformed into its one-mode projection (actors by actors, and collective goals by collective goals), two interesting things can be noted. First, the network showing the connections between actors (Figure 20) is divided into three different independent networks. One large network (bottom left in figure), and two smaller ones (top right side in Figure 20). Second, the network of collective goals by collective goals (Figure 21) is a single social network in which all the collective goals are connected to each other by the co-participation of actors.

In the case of the social network displaying the connections between actors, the subdivision of the network into three independent networks is explained by the presence, or absence of Neza residents in them. First, the largest network (the one integrated by 700 hundred actors, bottom left in figure) has a large presence of Neza residents, whose repeated participation in all the collective goals among other types of actors, links together the network. Second, the formation of the two smaller networks (top right side in figure) is explained by the participation of government actors, and contractors in a single event involving a unique collective goal. Furthermore, participation of these actors in both of the small networks occurred without the involvement of Neza residents. This might show the exclusive nature of the connections between public-work contractors and the government. Thus, if the definition of social networks as the structures that emerge from patterns of repeated interaction between members of society (DeFilippis, 2001) is applied here, then it could be argued that there is only one social network in Neza's resilience. This social network corresponds to the largest component in Figure 20 (bottom left in figure).

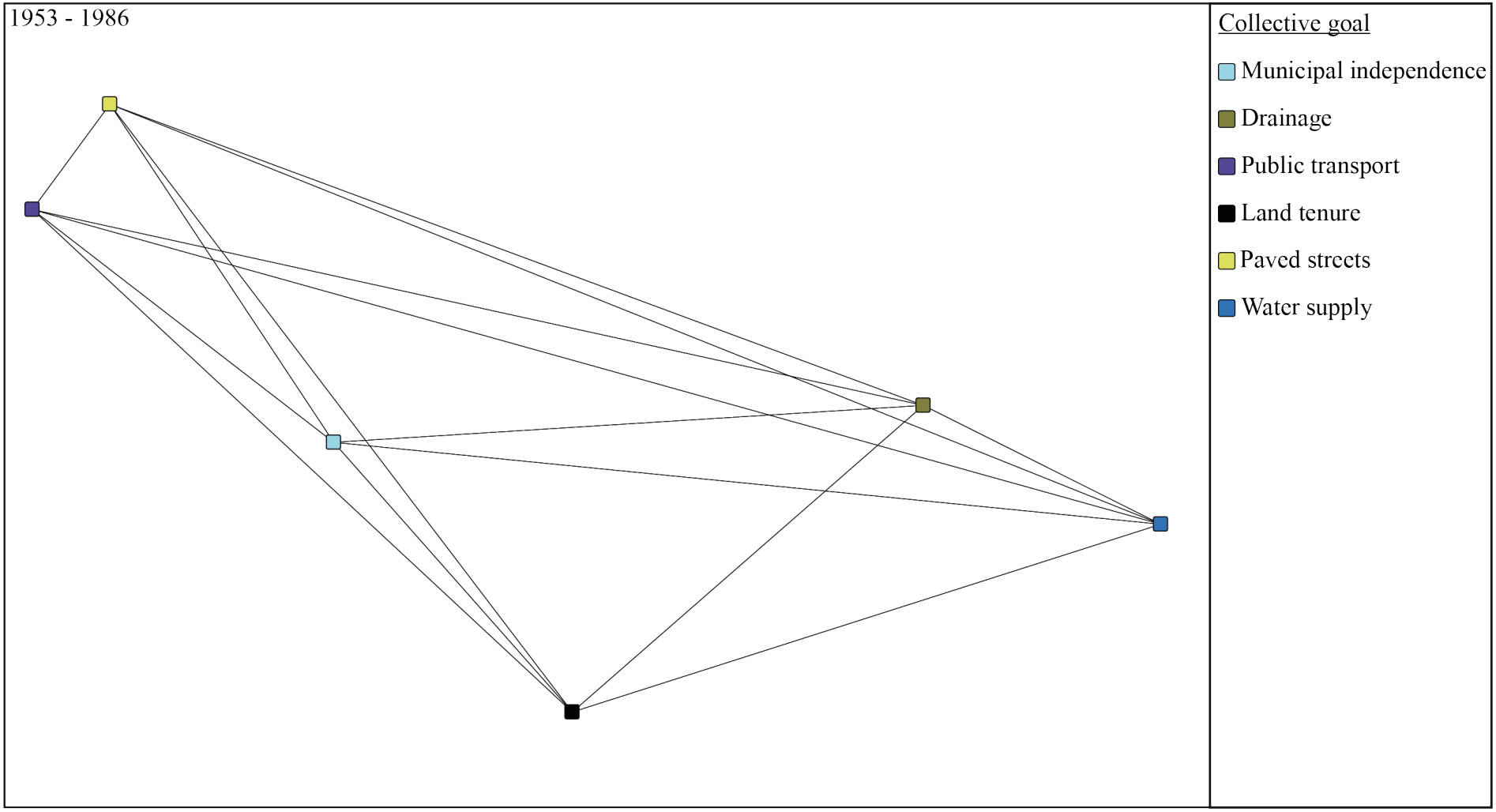
In the case of the network of collective goals by collective goals (one-mode), its patterns of connections form a single network, shown in Figure 21. The interconnection of collective goals happens because some actors co-participated in multiple collective goals, along other actors who participated in other collective goals. Structurally, this indicates some coordination in the pursuit of collective goals, as the achievement of one goal allowed the achievement of others (interview data discussed in Chapter 4 corroborates this). However, as shown in the graphs here described, only a few number of actors participated in more than one of the collective goals. The identified social network has five different possible projections: actors by collective goals (two-mode) (Figure 19), actors by actors (one-mode) (Figure 20), collective goals by collective goals (one-mode) (Figure 21), actors by period of participation (two-mode) (Figure 23), and collective goals by period of occurrence (two-mode) (Figure 24), all of which are analysed in the following lines.

Figure 20. *Neza's one-mode social network, collective goals by collective goals (1953-1986)*



Source: Author's elaboration.

Figure 21. *Neza's one-mode social network, collective goals by collective goals (1953-1986)*

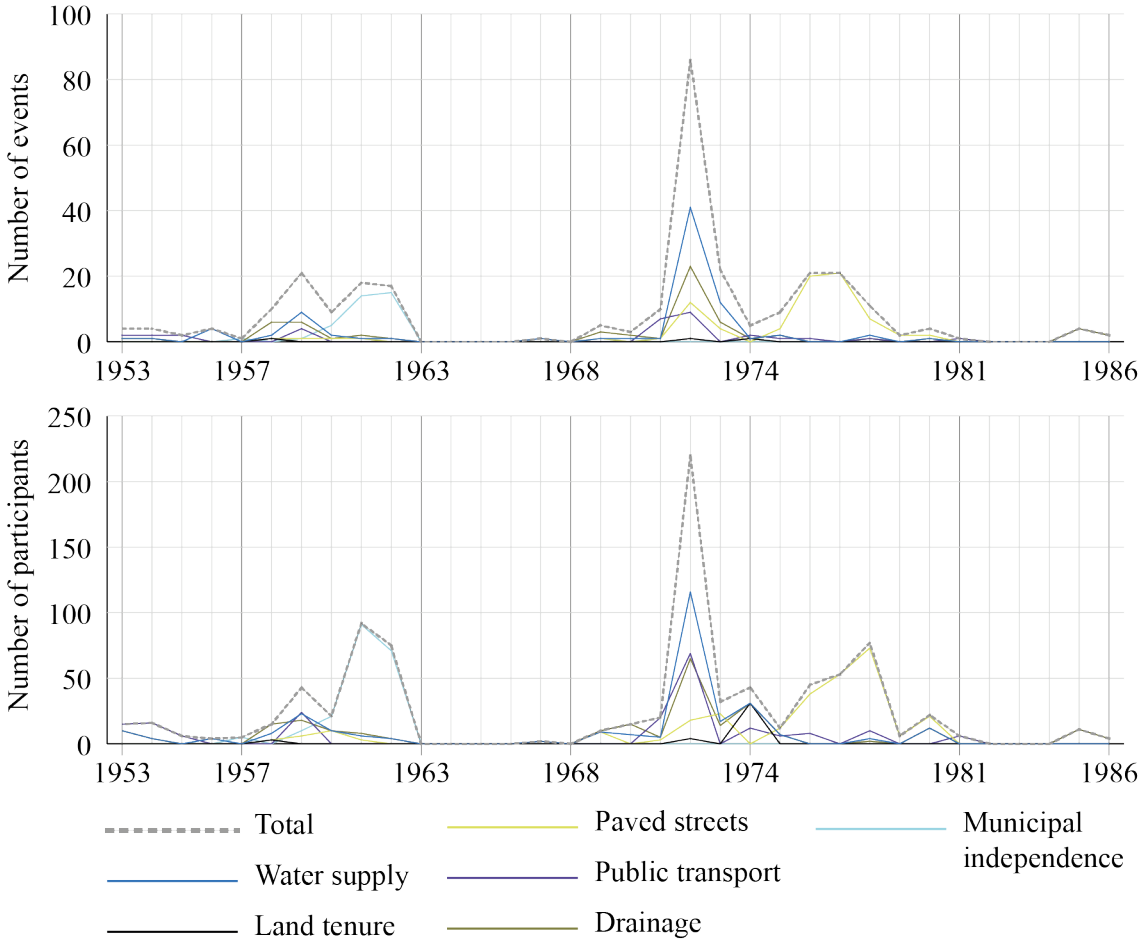


Source: Author's elaboration.

6.2 The evolution of the social network activity

The identified social network existed through the sustained activity of actors engaged in the pursuit of collective goals during 33 years of observed interactions (1953 – 1986). This section analyses the evolution of social interactions around collective goals throughout this period. This is investigated in terms of the intensity of activity through time, measured by the number of events and participants registered per year of activity, and its relation to the importance of the collective goals pursued; results show the existence of distinctive periods of engagement. The importance of collective goals is also measured by the number of participants that each collective goal gathered per period. The result of this is twofold. First, distinctive periods in Neza's social network's activities are identified. Second, the identification of periods of Neza's network's activities effectively serves to identify the different phases in the evolution of the social network that participated in the achievement of Neza's resilience.

Figure 22. *Peaks in collective action 1953 – 1986*



Note: Graphs show the total number of events and participants registered in the documents investigated per year.
Source: Author's elaboration.

The results of calculating the number of actors and events for each year of the period is presented in Figure 22. As it is possible to observe, Neza's collective action was not a linear process. Rather than that, collective action experienced moments of intense activity, and moments of low intensity through the observed years. This is consistent with the idea that in ecological-resilience, periods of slow change interplay with periods of rapid change (Folke, 2006). In the case of Neza's collective action, the following periods represent moments of rapid change: 1957 – 1963, 1968 – 1974, and 1975 – 1981 (differences between 1968 – 1974, and 1975 – 1981 are described below); while the periods of slow change are: 1953 – 1956, 1964 – 1967, and 1982 – 1986. This division of periods of Neza's collective action was informed by the analysis of Figure 22, in combination with milestones identified in bibliographical sources (Castillo, 2010; Espinosa Castillo, 2005, 2008; Montejano Castillo & Torres Zárate, 2011) and interview data (discussed in Chapters 5, and 7). Milestones are defined by the achievement of Neza's collective goals: municipal independence (1963), secure land tenure (1974), and the completion of street paving works (1980's).

Thus, it is possible to divide the evolution of Neza's collective action as follows: 1953 – 1956 early organisation; 1957 – 1963 peak in collective action and achievement of municipal independence; 1964 – 1967 post-municipal independence stability; 1968 – 1974 peak in collective action and achievement of land tenure rights; 1975 – 1981 post-land tenure rights and peak in collective action dominated by the collective goal of paved streets; and finally, 1982 – 1986 period of stability. As explained above, this is consistent with the notion that ecological resilience is related to the interplay of moments of change, and periods of stability. Furthermore, multiple stable states of a system are possible, depending on the different trajectories that interacting populations might develop (Folke, 2006; Young et al., 2006). This is an interesting concept for the identification of Neza's social networks, since different groups pursue distinctive sets of goals, and thus alternative stable states for the same system are possible. Also, the existence of multiple moments of change and stability might indicate that network participants identify aspects of the system, perhaps, as external disturbances that require to be tackled to achieve increasing states of resilience. This also resonates with the idea that external disturbance can provide opportunities for renewal, and reorganisation towards more desirable trajectories and points of equilibrium (Adger, 2006; Davoudi, 2012; Folke, 2006).

By analysing each of the periods of rapid change, it is possible to observe a distinctive pattern. Periods of rapid change seem to follow a three-phase evolution: formation, peak and acute reduction of network's size (number of active members) and activities. Given that Neza's social network always maintained some activity with some actors participating longitudinally (this is further discussed in section 6.3), it is here interpreted as the network entering a latent state at the end of (and before) each rapid change period. Therefore, periods of slow change can be defined as latent network stages.

From the data presented in Figure 22, it is possible to see that the community participation in Neza, measured by the fluctuations in the size of the network and the number of events registered, experienced three periods of rapid expansion. One from 1957 to 1963, other from 1968 to 1974, and the last one from 1975 to 1981. This last one seems to be the resurgence of the 1968 – 1974 collective action, however, this last peak is dominated by a single collective goal (paved streets), and is preceded by an acute decline in activity from the 1968 – 1974 period. For these reasons, it is considered that this is a distinctive period from that of 1968 – 1974.

The pattern in activity observed in each of the periods of rapid change shows that the evolution of the social network fluctuates according to the collective goals pursued. In Figure 22, it is possible to observe that the period of 1957 – 1963 describes a three-phase trajectory. The formation stage in the 1957 – 1963 period is evident during its first two years. In this phase, the social network had five collective goals (public transport, water supply, drainage, paved streets, and municipal independence). During this first phase, the social network was formed and gained momentum by gathering participants through their shared goals. The second stage is characterised by the definition of a collective priority among goals. In the case of the 1957 – 1963 period, the definition of a collective priority is evident by the emergence of the collective goal of municipal independence as a predominant goal, and the reduction in importance of the rest of the goals (measured in terms of number of participants by collective goal). The third and final phase of the network is characterised by the reduction in the size of the network and the number of events registered. Given that the collective goal of municipal independence was met in 1963, this also marks the end of the 1957 – 1963 period.

The second period of intense activity is that of 1968 – 1974. Similar to that of 1957 – 1963, the period of 1968 – 1974 started its formation with the appearance of multiple collective goals (paved streets, public transport, water supply, drainage, and land tenure). Then, one predominant collective goal emerged (water supply). Although during this period the collective goals of public transport and drainage are also important, the collective goal of water supply gathered nearly twice the participants and events than public transport and drainage. Following this, the reduction of network's size and activities occurred in year 1974, which happened in a similar fashion as in the 1957 – 1963 network. That is an abrupt decline in the number of participants and events observed. The decline of the network is linked with the meeting of the period's predominant collective goal. According to the information collected in interviews, the construction of water supply and drainage infrastructures occurred by the end of the 1968 – 1974 period, which is consistent with the information presented in Figure 22. However, the identification of the principal collective goal for this period differs between data collected in archives, and the accounts offered by interviewees. According to interviewees, the main collective goal of the period was that of land tenure rights, goal that was also met at the end of the 1968 – 1974 period (this is further discussed in Chapter 7).

The third and final period of intense activity is that of 1975 – 1981. This period shares the characteristics of the previous ones in the sense that it also followed a trajectory of network formation, peak and reduction of network's size and activities. This last period also had a starting point in which multiple goals are present (public transport, water supply and paved streets). However, one difference between this period and the previous ones is found in the second stage of the network's trajectory. The second stage is defined, in previous periods, by the emergence of a dominant collective goal. While in the previously described periods of rapid change the emergence of a predominant collective goal occurs gradually, in the period of 1975 – 1981 a dominant collective goal is present from the very beginning (paved streets). The final stage is also similar to that of previous periods. Network's size and activities reduction was also very acute, and as in the previously described stages, this also corresponds to the period in which the main goal of the period is met. This was also corroborated in interviews, as interviewees identify the completion in the works to deliver paved streets in Neza by the end of this period.

The reduction in size of the network after the achievement of a collective goal is evidence that social engagement in the network was goal-related. Once collective goals were met, the social network tended to reduce its size (see Table 10 and Figure 22). As previously stated, evidence of this pattern of network reduction in size is also present in interviews. Interviewees described years 1963, 1974, and in a less precise fashion, the decade of the 1980's as the moments in which specific collective goals were met: municipal independence (1963); water supply, drainage and land tenure rights (1974); and paved streets (1980's). However, interviewees also mentioned as a reason for the reduction of the network's size, the cost of participating in them, as maintaining an active network requires the sustained participation of its members, distracting them from other important activities (i.e. work). From a resilience perspective, the emergence of social networks imply that systems have encountered an external disturbance that needs to be faced, which promote change towards more desirable states; while the collapse of the networks indicate that the system has reached a more desirable state of stability. However, as the process of identification of social relational data of Neza's collective goals showed that only one network was present during the years observed, this might indicate that the network was never entirely dismantled during the inter-periods of slow change, as external disturbances were still present, and as such collective goals remained current. This implies that the network transitioned between periods of high activity and periods of latent activity. This is discussed in the following sub-section.

6.3 Sustaining the network

The interplay of periods of rapid change and stability observed in Neza's social network indicates that the network was never completely disintegrated. Rather than that, transition periods suggest that the network had the ability of activating itself as required,

while entering latent states when collective goals were met without entirely dissolving the network. This was made possible by a group of actors sustaining the network across periods, as well as the persistence of unmet collective goals. These actors might have been the ones that possessed the ability of activating the network as needed, by acting as conduits of information across members of the network. On the other hand, unmet collective goals were the motives for the reactivation of the network. To understand this, two visualisations of the network were prepared linking actors with the periods of activity (both rapid change and stability) in which they participated (Figure 23), as well as a network of the collective goals linked to the periods in which they were pursued (Figure 24 in page 156).

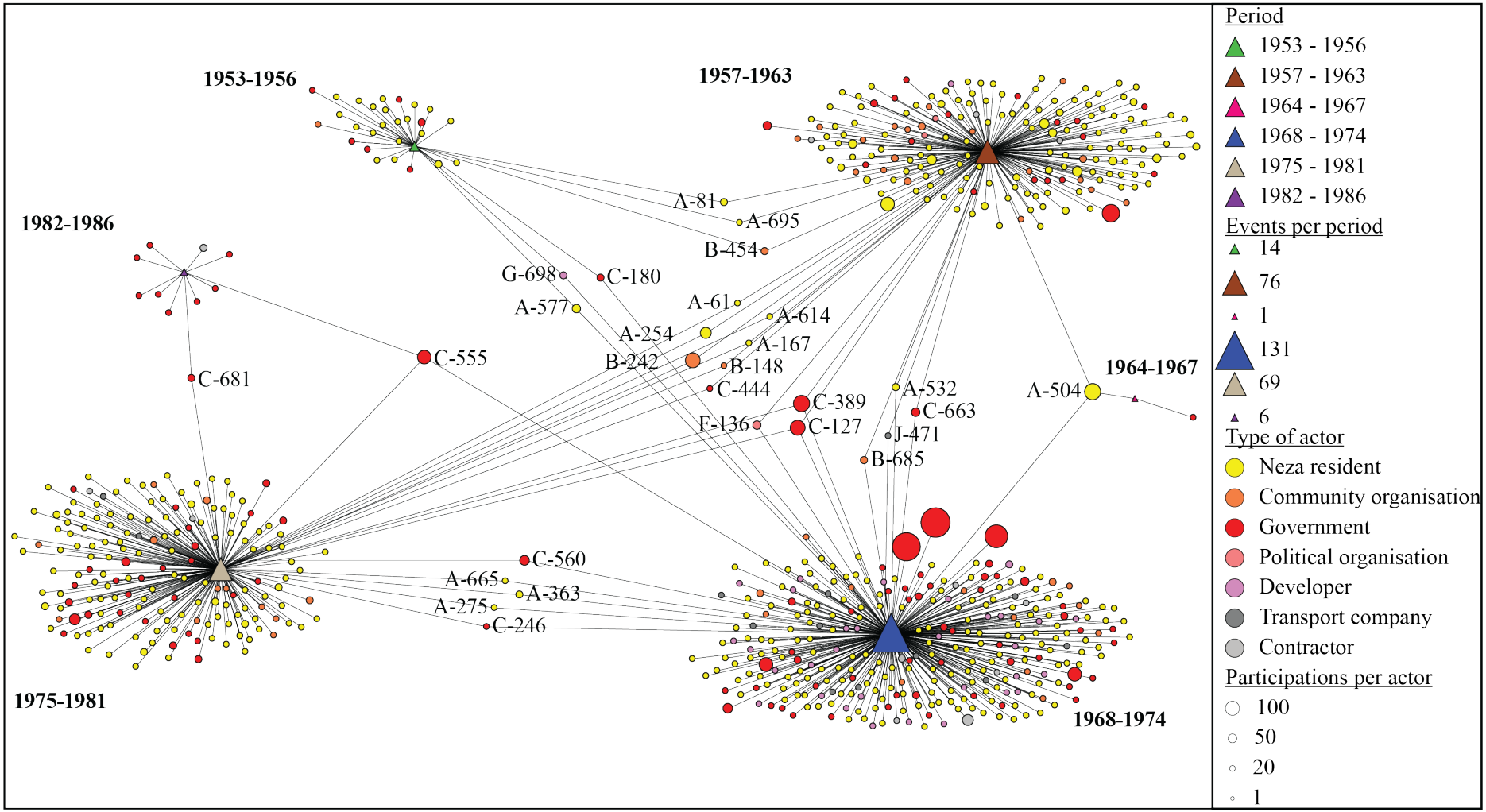
Figure 23 portrays the actors that participated in each of the periods as well as those connecting multiple periods. These actors bridging multiple periods may have served the network as conduits of information and might have helped to sustain Neza's collective goals and action over time. Twenty-eight actors (Table 8) participated in more than one period. Five of those also participated in three different periods: a high-ranking state-government official (government actor C-389), a member of the community who is recognised as the founding leader of the municipality (Neza resident A-504), one political organisation (F-136), an actor from the state's public works office (government actor C-555), and an actor from the state's water supply company (government actor C-127).

Table 8. Participants in multiple periods

Actor	1953-1956	1957-1963	1964-1967	1968-1974	1975-1981	1982-1986
B-454	●	●				
A-695	●	●				
A-81	●	●				
G-698	●			●		
A-577	●			●		
C-180	●			●		
C-127		●		●	●	
F-136		●		●	●	
C-389		●		●	●	
A-504		●	●	●		
A-61		●			●	
B-148		●			●	
A-167		●			●	
B-242		●			●	
A-614		●			●	
A-254		●			●	
C-444		●			●	
B-685		●		●		
C-663		●		●		
J-471		●		●		
A-532		●		●		
C-246				●	●	
A-275				●	●	
A-363				●	●	
A-665				●	●	
C-560				●	●	
C-555				●	●	●
C-681					●	●

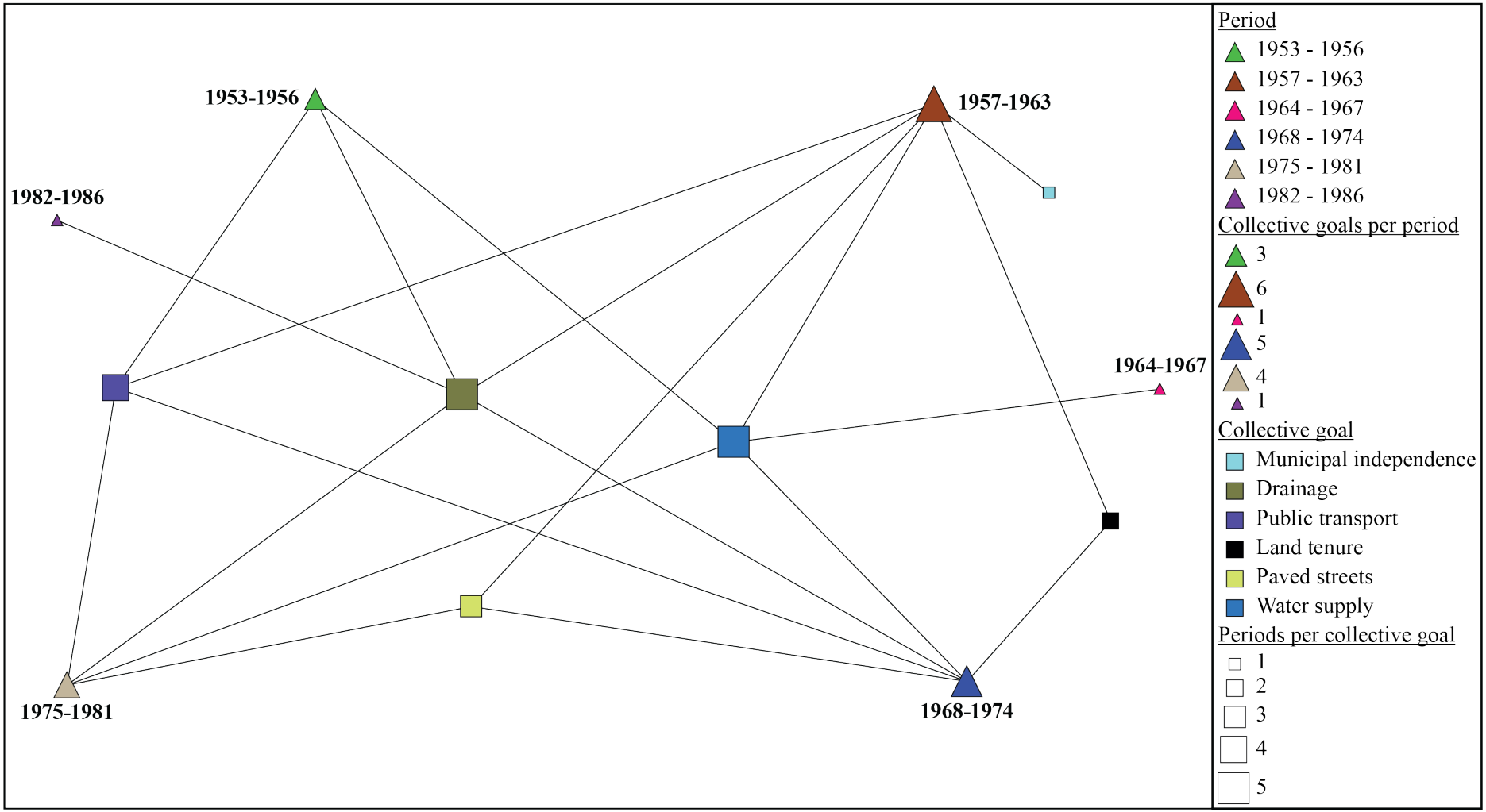
Note: type of actors: Neza resident (A), Community organisation (B), Government official (C), Political organisation (F), Developer (G), and Public transport entrepreneur (J).
Source: Author's elaboration

Figure 23. *Community participation by period, actors by period*



Source: Author's elaboration.

Figure 24. *Collective goals by period*



Source: Author's elaboration

It is interesting that actors bridging multiple periods did not necessarily bridge consecutive periods. Regarding the actors that bridged three periods, all of them started their participation during the second analysed period (1957 – 1963), that is, once the social network reached its first peak of action. On the other hand, the only period in which all of these actors participated again is that of 1968 – 1974, which is the peak in the collective action of Neza's network. It is also interesting that A-504 was the only actor that bridged the periods of 1957-1963, 1964 – 1967, and 1968 – 1974. A-504 was a Neza resident, whose participation helped to sustain the network between the two most relevant periods of rapid change, and is recognised by most interview participants as one of the most prominent leaders in Neza history. 38 Perhaps her participation, along other local leaders in key moments of Neza history was instrumental in gathering large numbers of participants for the pursuit of collective goals.

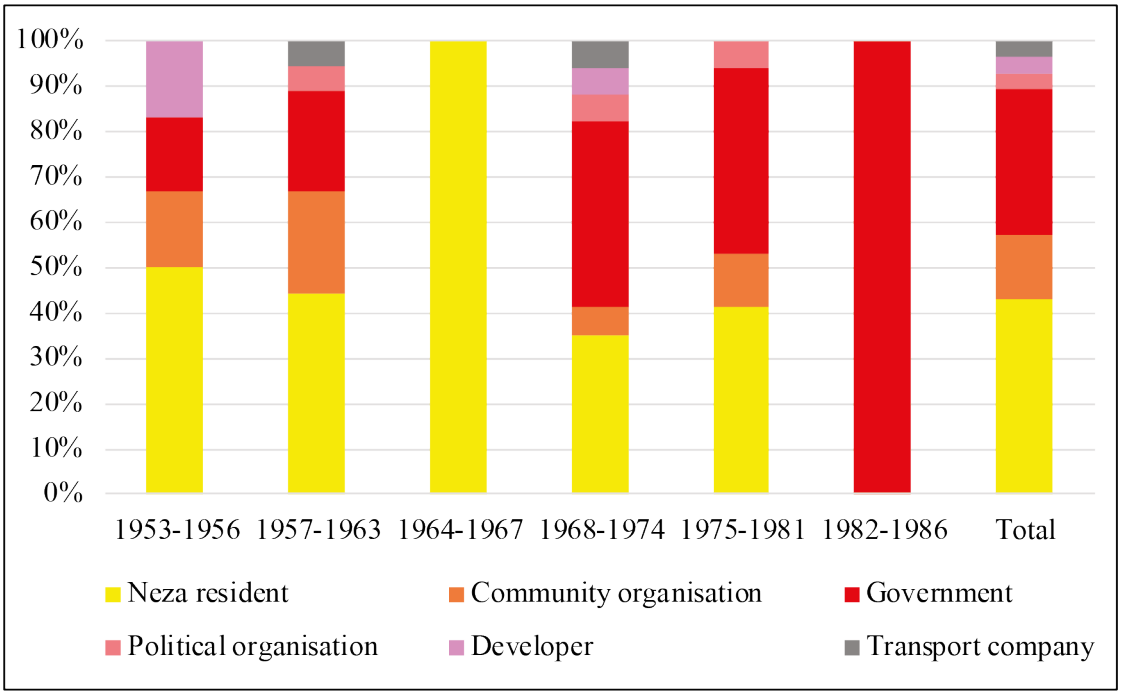
Regarding the actors who participated in two periods, there are three who participated in the 1953 – 1957 period, skipped the periods of 1957 – 1963 and 1964 - 1967, and participated again in the period of 1968 – 1974. This is interesting because the period of 1957 – 1963 had almost a single collective goal: municipal independence, while the period of 1968 – 1974 share a similar set of goals from the period of 1953 – 1957: water supply, public transport, drainage, and paved streets. That might indicate that these actors did not see the achievement of municipal independence as their most pressing goal; while there are eight actors that participated in both of the periods of maximum activity of the network (1957 – 1963, and 1968 – 1974), out of which seven skipped the inter-period of 1964 – 1967. It is possible that these actors might have perceived that the achievement of municipal independence was sufficient to meet the rest of their goals, and when they realised that this was not the case, they might have participated again in the network in the period of 1968 – 1974. The period of 1968 – 1974 was characterised by the pursuit of the collective goals of water supply, drainage, paved streets and land tenure. Thus, participation in this period and the one of 1964 – 1967 might indicate that these were the main collective goals of these actors.

A set of actors that participated in the periods of 1957 – 1963, skipped the periods of 1964 – 1967 and 1968 – 1974, and resumed their participation during the period of 1975 – 1981. These actors are interesting because, as previously described, the period of 1957 – 1963 gathered all the collective goals studied in this thesis, while the period of 1975 – 1982 had as its main collective goal that of paved streets. Participation in both periods might indicate that actors kept the collective goal of paved streets at the top of their priorities, and only resumed participation when this goal was the priority for the rest of the network. Similarly, the continuous participation of actors during the periods of 1968 – 1974 and 1975 – 1981 might indicate that these actors had as their main goal

38 Actors A-81, A-363, A-577, and A-614, were also recognised by interviewees as important leaders in the history of Neza. These actors also bridged different periods.

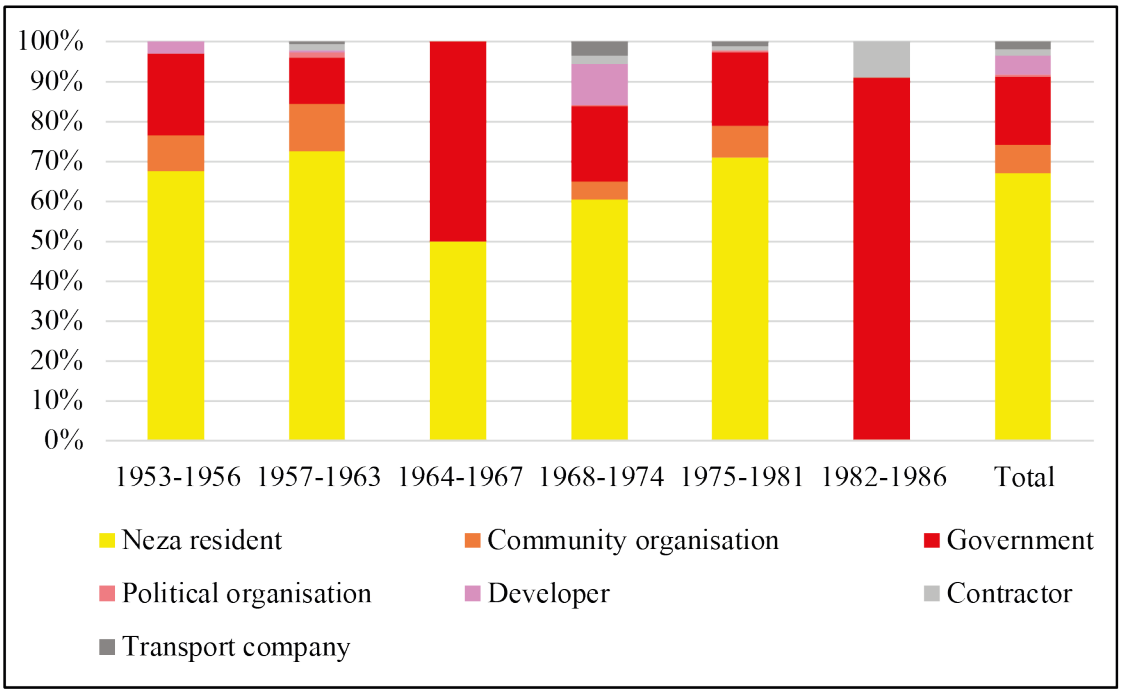
to achieve paved streets. These two actors (C-555, and C-681 in Table 8) whose participation transitioned from the periods of 1975 – 1981 and 1982 – 1986, were government actors engaged in the completion of the public works of Neza.

Figure 25. *Characteristics of inter-period connecting actors*



Source: Author's elaboration.

Figure 26. *Type of actors per period*



Source: Author's elaboration.

The participation of actors in multiple periods indicates, on the one hand, that Neza's collective goals which related to public works, required the longitudinal action of network participants. On the other hand, the composition of the set of actors connecting

multiple periods reveals that sustaining the network required not only the involvement of Neza residents, but a diverse set of connections between different stakeholders, which are government officials, political organisations and community leaders (Figure 25).

From Figure 25, and Figure 26 it is also interesting to note that the actors in the different periods of rapid change are similar to each other. In each period, there is a presence of a variety of actors, out of which Neza residents represent a majority. However, when contrasting the differences in the composition of actors participating in multiple periods, it is possible to see that political organisations (F-136 in Table 8) are only present in the periods of rapid change. This might illustrate the role of politics in boosting social capital and collective action (Szreter, 2002). And furthermore, as explained by Coaffee, Wood Murakami, and Rogers (2009, p. 3), 'the building of resilience will be most effective when it involves a mutual and accountable network of civic institutions, agencies and individual citizens working in partnership towards common goals within a common strategy'.

In the case of periods of slow change (1953 – 1956, 1964 – 1967, and 1982 – 1986) two compositions are noted. In one case, that of 1953 – 1956, a diversity of actors (B-454, A-695, A-81, G-698, A-577, and C-181) participate in multiple periods (see TTable 8), however, this period lacks the participation of political organisations, as well as of a rapid accumulation of participants. For this reason, this period is considered as a stable one, as this period does not follow the three stages that characterise rapid change periods. The other distinctive pattern observed in the periods of slow change is that in the cases of 1964 – 1967, and 1982 – 1986, a single type of actors is connecting the network through different periods, Neza residents in the first one, and government actors in the second. From these observed patterns it is possible to observe that political organisations may act as facilitators in the achievement of collective goals, and thus their presence is most required in moments of rapid change. In periods in which only one type of actors is observed, their presence may be related to a sustained interest in the achievement of Neza's collective goals, thus government actors and Neza residents are the type of actors that maintain collective goals active in periods of slow change. This might be because Neza residents are the ones interested the most in meeting their collective goals, and government actors are the agents with whom Neza residents maintain contact for achieving the collective goals.

The importance of the different periods in terms of serving as passing points for sustaining the activity of Neza's social network can also be analysed using the SNA measurement of betweenness centrality. As explained in Chapter 3.4, betweenness centrality measures how many actors a specific actor connects as an intermediary. Thus, the actor (vertex) that serves as passing point to connect with the largest number of other actors in a network would score the highest betweenness centrality. In a similar vein, the importance

of each period as passing points for the collective action of other periods can be measured in terms of betweenness centrality. Table 9 contains betweenness scores for each of the periods analysed in this research.

Table 9. *Two-mode centrality measures (actors by events); period values*

Period	Network size	Events	Degree	Betweenness
1953-1956	34	14	0.048	0.079
1957-1963	194	76	0.275	0.458
1964-1967	2	1	0.003	0.003
1968-1974	309	131	0.438	0.676
1975-1981	189	69	0.268	0.440
1982-1986	11	6	0.016	0.025

Source: Author's elaboration.

Betweenness centrality of the observed periods show that the period of 1968 – 1974 is the one that serves as bridge between the other observed periods. This is not just because this period is the largest in terms of the number of participants, but because is the one that has the greatest number of members that participated in more periods. In this sense, the period of 1968 – 1974 is the one that served as common participation point for most trans-period participants. In fact, the period of 1968 – 1974 is the only one that presents common participants with all the rest of the periods. This may indicate that multi period participants found in the period of 1968 – 1974 a relevant moment for participation, as the collective goal being pursuit in this period was that of land tenure rights. The second ranking period in terms of betweenness is 1957 – 1963. This is interesting because both periods, 1957 – 1963 and 1968 – 1974, are the ones that are most commonly referred to as the most relevant by interviewees, as the ones that permitted the overall achievement of Neza's collective goals. While the period of 1975 – 1981 ranks third in betweenness centrality, this period is only mentioned by most interviewees as the one in which the collective goal of paved streets was achieved. While the betweenness of the periods of 1953 – 1956 and 1982 – 1986 is nearly inexistent, showing that in terms of collective action, these periods had the least importance for the achievement of Neza's collective goals. Furthermore, these periods represent moments of stability in the system.

This section has discussed the longitudinal engagement of network actors forwarding the collective goals of early Neza residents. It was stressed that the longitudinal operation of the network passed through stages of intense activity, and others of latent activity. The network was sustained between these phases in activity by the engagement of a handful of actors who were able to activate large numbers of network participation as required for the achievement of collective goals. In the following section, the evolution in the achievement of collective goals is presented.

6.4 The evolution of Neza's collective goals

This section discusses the evolution of the collective goals pursued by Neza residents from a social network perspective. First, collective goals are measured relying on two-mode centrality measures of the each of the periods observed, as well as in the aggregate of periods. Results of two-mode degree centrality measures are used to clarify what collective goals were the most relevant ones in terms of number of participants engaging in them. Betweenness centrality scores help understand which collective goals served to connect other collective goals through the co-participation of network actors in multiple collective goals. Following this, the location of collective goals in the graphic projection of two-mode social networks is explained.

Table 10. Two-mode degree centrality*, values of collective goal per per*iod*

Collective goal	All	53-56	57-63	64-67	68-74	75-81	82-86
Municipal independence	158	0	158	0	0	0	0
Drainage	203	14	41	0	123	20	11
Land tenure	38	0	3	0	35	0	0
Public transport	173	30	24	0	92	30	0
Paved streets	226	0	15	0	43	175	0
Water supply	242	18	39	2	167	21	0

Note: The total number of participants per collective goal differ from the total of participants observed per decade, this is due to actors'participation in more than one collective goal.
*Degree centrality measured by the number of participants per event.
Source: Author's elaboration.

Table 11. *Two-mode degree centrality, values of collective goal per period (normalised*)*

Collective goal	All	53-56	57-63	64-67	68-74	75-81	82-86
Municipal independence	0.224	0	0.814	0	0	0	0
Drainage	0.288	0.412	0.211	0	0.398	0.106	1
Land tenure	0.245	0.882	0.124	0	0.298	0.159	0
Public transport	0.320	0	0.077	0	0.139	0.926	0
Paved streets	0.054	0	0.015	0	0.113	0	0
Water supply	0.343	0.529	0.201	1	0.540	0.111	0

**Normalised two-mode degree centrality: degree centrality divided by the size of the opposite set (Stephen P. Borgatti & Everett, 1997)*
Source: Author's elaboration.

According to Stephen P. Borgatti and Everett (1997, p. 254), degree centrality of two-mode networks *"is defined as the number of edges incident upon that node"*. For the case at hand, this means that the degree of a participant is the number of events they attended, and the degree of an event is the number of participants that attended an event. However, Stephen P. Borgatti and Everett (1997, p. 254) also recommend to normalise

the results by *"divid[ing] each score by the size of the opposite vertex set"*. The latter is the way in which UCINET (Stephen P Borgatti et al., 2002) computes two-mode degree centrality. This metric is used to provide an idea of the evolution of the priorities that the social network involved in the resilience of Neza had per period. Results of measuring two-mode centrality are presented in Table 10, and normalised results are presented in Table 11.

As it is possible to see, a discrepancy in the correlation of values between normalised and un-normalised degree centrality is found. This is the case, because this conversion is not linear, as noted by Stephen P. Borgatti and Everett (1997), given that the two sets of data have different sizes; though normalisation improves the comparability of scores. From the results of two-mode degree centrality, it is possible to derive which collective goals were the most popular (Table 10 in page 161). It is assumed that those goals which gathered the greatest number of participants were the most important to the participants themselves. Thus, it is possible to rank each goal per period, and the aggregate of all the observed periods (Table 12).

Table 12. *Ranking of collective goals per period (by degree centrality values)*

Rank	All	53-56	57-63	64-67	68-74	75-81	82-86
1st	Water supply	Public transport	Municipal independence	Water supply	Water supply	Paved streets	Drainage
2nd	Paved streets	Water supply	Drainage		Drainage	Public transport	
3rd	Drainage	Drainage	Water supply		Public transport	Water supply	
4th	Public transport		Public transport		Paved streets	Drainage	
5th	Municipal independence		Paved streets		Land tenure		
6th	Land tenure		Land tenure				

Source: Author's elaboration.

From the overall ranking of priorities, some important conclusions are reached, such as the fact that the collective goal of water supply was the most relevant from a longitudinal perspective. Also, those collective goals of independent municipality and land tenure appear at the bottom of the list; despite those goals being considered of great importance for the development of the municipality by a large number of interviewees. This discrepancy might indicate that only few members of the community were able to identify strategic goals (municipal independence and secure land tenure) as a means to

meet the rest of their goals. The rest of the community was only able to identify the most immediate needs as their main goals for collective action (water supply, paved streets, drainage, and public transport).

Not all the collective goals are present in all the observed periods. The explanation of this is fourfold. First, at the initial period (1953 – 1956), the list of collective goals only corresponds to those that are necessary to meet the minimum standards for urban living: public transport, water supply, and drainage infrastructures. Strategic goals only appear in the following period. Second, strategic goals are only present in the periods in which peaks of network activity are registered (1957 – 1963, and 1968 – 1974). This might indicate that indeed, these goals were strategic for meeting the rest of the collective goals. Third, when a collective goal is met, it disappears. This is the case for the collective goal of municipal independence after 1963, and land tenure after 1974. Fourth, in the periods of slow change (1953 – 1956, 1964 – 1967, and 1982 – 1986), most of the network turns into a latent state, given that their participants might have perceived a favourable environment to meet the collective goals.

Regarding the 1957 – 1963 period, it is to be noted that while it is the first period of rapid change studied in this research, it is also the only one in which a strategic goal ranks first. While the rest of the goals are still present during the 1957 – 1963 period, their presence is rather modest in comparison. In total 253 actors participated in 76 events. Out of this, 198 (79%) actors participated in 36 (47%) events related to independent municipality. This may be indicative of a strategic behaviour of the network, in which the majority of actors focused on the most urgent goal, or the one that participants perceived as strategic to meet the rest of their goals. This period has another peculiarity, from the observed data, one Neza resident actor (node) was central (highest degree centrality in the 1957 – 1963 period) in mobilising the collective action for municipal independence: A-504 (Neza resident). This actor maintained a relevant role in the community from the decade of the 1950s until the 1970s, serving as an intergenerational bridge, and is highly recognised by interviewees as a key actor for the formation of the municipality.

During the period of 1964 – 1967, water supply is the only registered collective goal. Even when this period is a stable one (i.e. slow change), the presence of the collective goal of water supply suggests that collective goals were not being met, despite the network reaching its smallest size during this period (two members, and only one event). The reduction in size of the social network after the achievement of municipal independence might have been interpreted, by network participants, as the starting point towards meeting the rest of collective goals. However, as the achievement of municipal independence did not forward the solution of the rest of the collective goals, the collective goal of water supply, and the participation of actor A-504, might have helped the network to reactivate the network for the next period of rapid change: 1968 – 1974.

In the period of 1968 – 1974, the ranking of collective goals is as follows: water supply, drainage, public transport, paved streets, and land tenure. Here it is necessary to remark that the demand for land tenure is ranked fifth (out of five) when measured by the number of actors participating in it (degree centrality), which is consistent with what interviewees stated during the second stage of fieldwork. In interviews, most participants ranked the achievement of water supply, drainage, and public transport at the top of their concerns. However, interviewees also referred to the struggle for land tenure as the 'umbrella goal' that they were seeking to accomplish to meet the rest of their demands in the second period of rapid change.

Following a similar pattern to the one observed in the period of 1957 – 1963, with the disappearance of municipal independence from the list of collective goals, in the period of 1975 – 1981 the collective action for land tenure is also put aside. As the negotiations between community, government, and real-estate developers culminated in the creation of the Trust of Nezahualcóyotl City (FINEZA, Spanish acronym), a trust dedicated to the expropriation of the land from the developers by the government, which was then legally sold to Neza residents (UN-Habitat, 2003, p. 94). This trust effectively served to formalise the tenure of land at the end of the period of 1968 – 1974. However, unlike the period of 1957 – 1963 in which after meeting the strategic collective goal of municipal independence the network significantly reduced its actions around the pursuit of basic collective goals in the following period; in the case of the 1975 – 1981 period unmet basic collective goals still were pursuit, despite the majority of the respondents considered that the collective goals of water supply, drainage and paved streets started to be met during this period.

Unlike the pattern observed in the period of 1964 – 1967 in which stability was reached after meeting its strategic goal, in the case of the 1975 – 1981 period, the network, measured by its size, rapidly recovered momentum after a brief, but steep decrease of its size in 1974. Probably this indicates that the network had learnt that meeting one strategic goal did not necessarily imply the achievement of the rest of their goals. This could be associated with the notion of social learning, which according to O'Brien et al. (2009), is one of the features fostered in resilient social-ecological systems. It is the last period (1982 – 1986), when the rest of community goals were drastically reduced in terms of their degree centrality, and the number of events observed, which can be seen as an indicator of community goals' accomplishment.

From the analysis of the measurements of betweenness centrality of the collective goals (Table 13), it is possible to reach some relevant conclusions. For this it is important to recall that the meaning of betweenness centrality is that of representing what nodes serves the most as a crossing path for the rest. In the case of the data here presented, and paraphrasing Stephen P. Borgatti and Everett (1997), this means that the betweenness of an actor or collective goal, is a function of paths from actor to actor, from actor to event,

from event to actor, and from collective goal to collective goal. In the case of the two-mode network of collective goals by actors, betweenness represents what collective goals served as intermediaries between actors, and the rest of the collective goals. From this perspective, in the aggregate of all the periods, it is interesting that the collective goal of paved streets is the one that served as the largest crossing point for the actors and the rest of collective goals. This can be explained by the sustained presence of the collective goal of paved streets through the observed periods, goal which according to most interviewees was met until the decade of the 1980s. This is consistent with the last peak in collective action (1975 – 1981), in which this goal is the dominant one for the period.

Table 13. *Two-mode betweenness; centrality values per collective goal per period*

Collective goal	Aggregate	53-56	57-63	64-67	68-74	75-81	82-86
Municipal independence	0.327	-	0.90	-	-	-	-
Drainage	0.245	0.05	0.11	-	0.36	0.01	1
Public transport	0.310	0.75	0.13	-	0.44	0.13	-
Paved streets	0.405	-	0.01	-	0.11	0.96	-
Land tenure	0.007	-	0.00003	-	0.02	-	-
Water supply	0.340	0.26	0.11	1	0.57	0.02	-

Source: Author's elaboration.

The scores of betweenness centrality of collective goals for the aggregate of the periods observed may offer some clues of the goals that served as conduits for Neza's collective action. While paved streets is the collective goal that served as the largest passing point between actors and all the rest of the goals, water supply, municipal independence, and public transport come next with very similar scores to each other. This could indicate that all these collective goals were pursued by a similar number of actors sharing the same concerns. The goal that presents the lowest score in the aggregate of periods is that of land tenure. This is striking because this goal, as mentioned earlier was stressed by interviewees as the most relevant for the achievement of the rest of Neza's basic goals. This tension between the underperformance of the goal, in terms of centrality measures (betweenness, and degree), and interviewees' perception might indicate that this collective goal was pursued relying on other means than those used for the rest of the goals. This may explain why land tenure actions were not proportionally registered in the official records used to inform the SNA here studied.

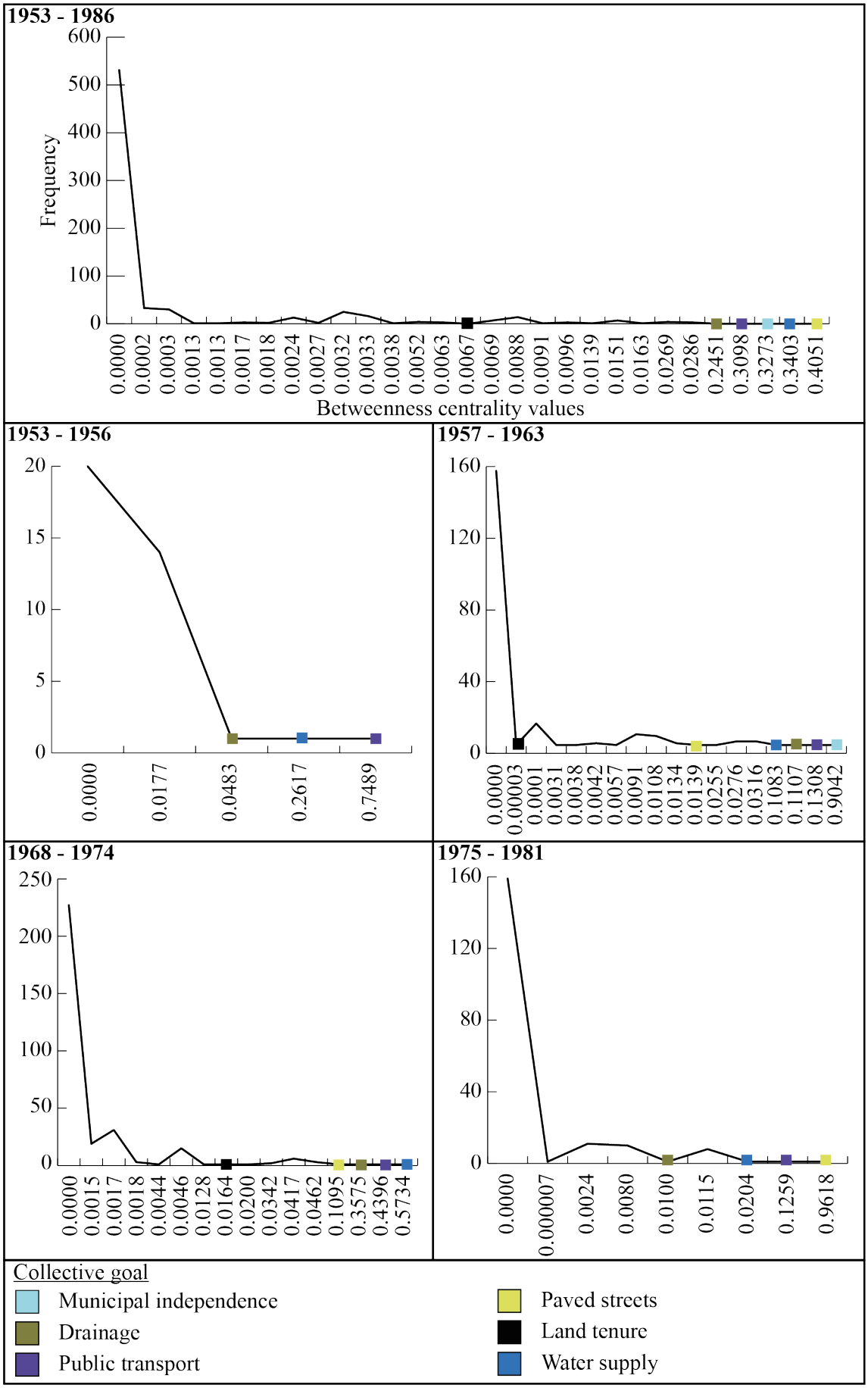
The measures of betweenness centrality here presented is that of a two-mode network. This means that nodes from both vertex sets, that of the collective goals and that of the actors, have their own betweenness values. While it is impossible to analyse all of the values of every node for each of the periods considered, a histogram of frequency (Figure 27) can be used to show the distribution of betweenness values of all the nodes per period. In Figure 27, betweenness values for the periods of slow change (1964 – 1967, and

1982 – 1986) are not plotted. This is because those periods only had a single collective goal, which obtained the largest betweenness value, as it was the only node that served as passing point for the rest of the nodes.

From the analysis of the histograms one pattern emerges: the majority of the nodes presents a betweenness value close to zero, while just a few nodes score higher values (Figure 27). This distribution of centrality values corresponds to the power law distribution described by Barabási and Albert (1999). According to Barabási and Albert (1999), large networks have the generic characteristic of having few vertices that dominate the connectivity of a network. That is, when a network grows, connections of new nodes do not occur in a random or uniform fashion, rather new connections tend to be added to nodes that already have a large number of connections. This power law can be observed in the histograms of frequency of betweenness (Figure 27) centrality values of the different periods observed in this thesis. In Figure 28, it is possible to observe that the highest betweenness values for all the periods are those of the collective goals, and not the actors.

As previously discussed, the location of nodes in the graphs correspond to their theoretical position (i.e. proximity of nodes in the graph correspond to their proximity in activity). Considering this, it is possible to observe what collective goals are closer to each other, and to which participants. From the relative position of goals in the graph corresponding to the aggregate of the periods (Figure 19), it is to be noted that the goals for municipal independence, public transport and paved streets, despite their size in terms of number of participants, appear to be rather peripheral to the core of activity. Meanwhile collective goals of water supply, drainage and land tenure are displayed close to each other, where a greater density of ties is observed. It is also interesting to note that actors participating in these collective goals (water supply, drainage and land tenure) also serve as bridges to connect with the peripheral goals (municipal independence, public transport, and paved streets) in the network. This unveils an interesting feature of Neza's collective action: there are some goals that are closely related, and others that stand alone. In this sense, the location of nodes in the graph show that actions to meet water supply, drainage, and land tenure are closely related to each other, as they share a large number of participants. While those goals of public transport, municipal independence, and paved streets, seem to be far to each other, even when these are also interconnected with all the rest of goals.

Figure 27. *Histogram of frequency of two-mode betweenness centrality values*

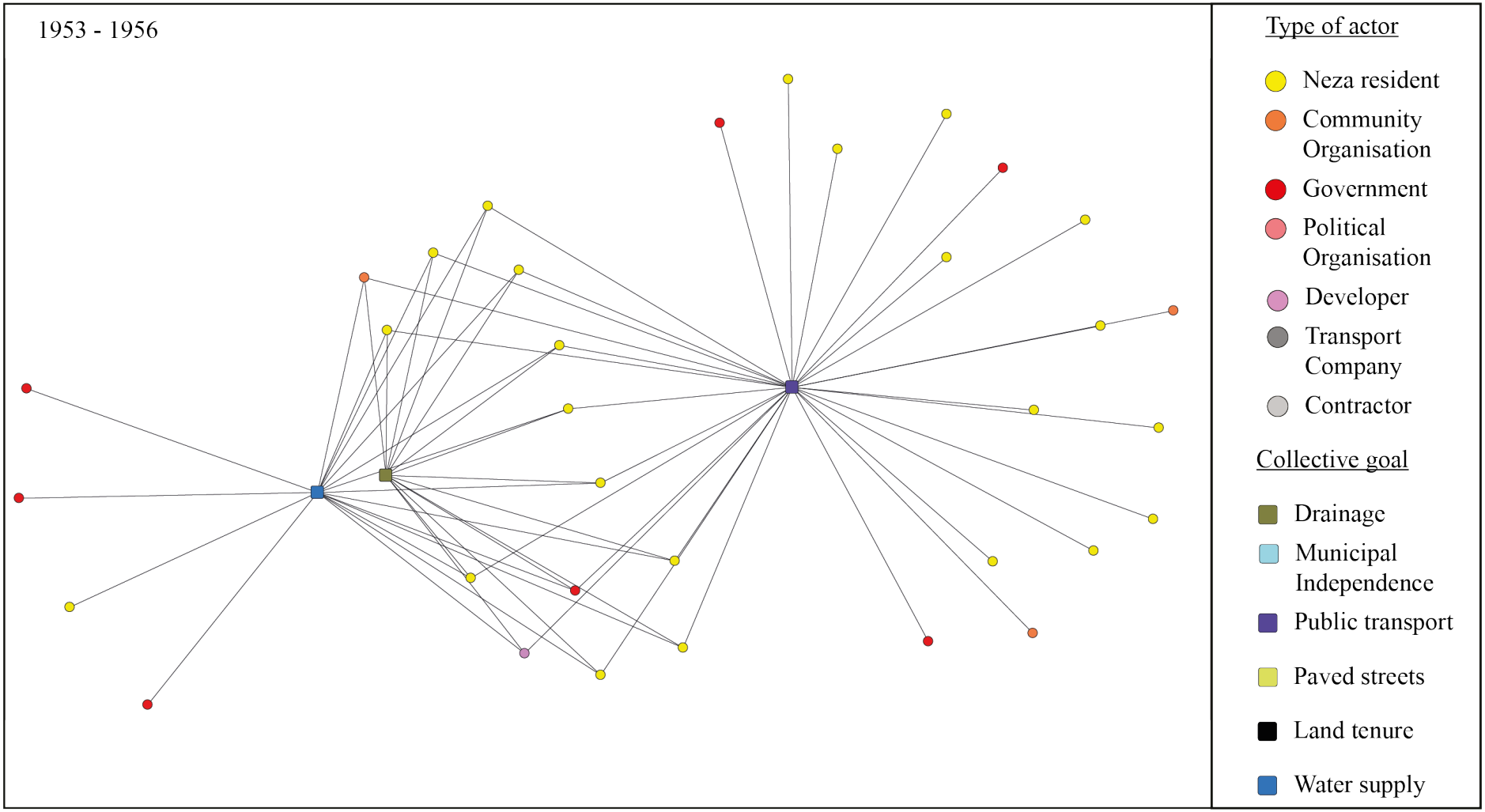


Source: Author's elaboration.

However, there are fewer actors connecting these collective goals (municipal independence, public transport and paved streets), than actors co-participating in water supply, drainage and land tenure. The interconnection between all the different collective goals proves that all of them were relevant for the conformation of Neza as a city, however there are some goals that are more interdependent than others. It might be useful at this point to recall that the distance between nodes in this projection correspond to the co-participation of actors in the same collective goals. That is, collective goals that share similar sets of participants are placed closer to each other; while actor's proximity to each other is related to the set of collective goals they participated at. This is interesting, particularly for the case of the collective goal of land tenure, which centrality's (degree and betweenness) scores are the lowest among all goals and observed years. However, land tenure's central location in the graph relates with the importance that interviewees give to that goal, as relevant for the achievement of the rest of Neza's collective goals. When the rest of the graphs corresponding to each of the periods are analysed, similar patterns emerge to the ones observed in the graph for the aggregate of periods. However, each period portrays a particular set of relations between its respective collective goals. The location of goals in the graph for the period of 1953 – 1956 (Figure 28) shows that the relation between water supply and drainage occupy almost the same position in the graph, meaning that they are closely related, in terms of sharing a very similar set of participants, whom might have identified this goals as closely related. Oposite to these goals, on the other side of the graph is located the collective goal for public transport, however, a few participants of this goal also participated in the water supply and drainage goals.

As previously discussed, the location of nodes in the graphs used in this thesis correspond to their theoretical position (i.e. proximity of nodes in the graph correspond to their proximity in activity). Considering this, it is possible to observe what collective goals are closer to each other, and to which participants. From the relative position of goals in the graph corresponding to the aggregate of the periods (Figure 19 in page 145), it is to be noted that the goals for municipal independence, public transport and paved streets, despite their size in terms of number of participants, appear to be rather peripheral to the core of activity; while the goals of water supply, drainage and land tenure are displayed close to each other, where a greater density of ties is observed. It is also interesting to note that actors participating in these collective goals (water supply, drainage and land tenure) also serve as bridges to connect with the peripheral goals (municipal independence, public transport, and paved streets) in the network.

Figure 28. *Two-mode network, actors by collective goals 1953 – 1956*



Source: Author's elaboration.

This unveils an interesting feature of Neza's collective action: there are some goals that are closely related, and others that stand alone. In this sense, the location of nodes in the graph show that actions to meet water supply, drainage, and land tenure are closely related to each other. While those goals of public transport, municipal independ-ence, and paved streets, seem to be far to each other, even when these are also intercon-nected with all the rest of goals. The interconnection between all the different collective goals proves that all of them were relevant for the conformation of Neza as a city, how-ever there are some goals that are more interdependent than others. This is interesting, particularly for the case of the collective goal of land tenure, which centrality (degree and betweenness) scores are the lowest among all goals and observed years. However, land tenure's central location in the graph relates with the importance that interviewees give to that goal, as relevant for the achievement of the rest of Neza's collective goals. When the rest of two-mode graphs corresponding to each of the periods (1953 – 1956, 1957 – 1963, 1968 – 1974, 1975 – 1981, 1982 – 1986)39 are analysed, similar patterns emerge to the ones observed in the graph for the aggregate of periods. However, each period portrays a particular set of relations between its respective collective goals. The location of goals in the graph for the period of 1953 – 1956 (Figure 28) shows that water supply and drainage occupy almost the same position in the graph, meaning that they are closely related, in terms of sharing a very similar set of participants, who might have identified these goals as closely related. Oposite to these goals, on the other side of the graph is located the collective goal for public transport, however, a few participants of this goal also participated in the water supply and drainage goals.

The period of 1964 – 1967 only presents a single collective goal (water supply), and two actors participating in it (A-504, and A-308) this means that all actors participating in the period are necessarily connected to each other and to a single collective goal. This offers little possibilities of analysis in terms of network graphic projection for the investigation of what collective goals were closer to each other in terms of the co-participation of network actors. For this reason, the graph for the 1964 – 1967 period is not included here (See the two- mode graph of period 1964 – 1967 in Appendix 14). However, this period is relevant as actors' participation around the collective goal of water supply proves that this was a continuing demand; and furthermore, that actor A-504, who is a multi-period actor (1957-1963, 1964-1967, and 1968-1974) while participating in this period may have passed relevant information between network's periods. However, the period of 1968 – 1974, the second period of rapid change, also provides some interesting clues. The graph for the period (Figure 30) shows an increase in activity, both in terms of the size of the network, and the diversification of goals. While the goal of municipal independence is no longer present, since it was met in 1963, the rest of the goals are present in

39 Graph corresponding to the 1964 -1967 period is not considered as only one goal involving two actors are displayed, offering little analytical value in the process of determining what collective goals were pursuit in an interrelated way by similar sets of actors. See the two- mode graph of period 1964 – 1967 in Appendix 14.

this period. In this graph it is possible to observe that the goals of drainage and land tenure share a similar position, while the goal of water supply is also related to them by a similar set of actors. This might indicate that the achievement of the collective goals of network participants was facilitated by the interrelated pursuit of goals by a defined set of actors. In this regard it is also to be noted that these collective goals are linked to each other by a large number of developers, while participants in the collective goals are mostly Neza residents. This is interesting because the resolution of these goals might have required the involvement of this particular group of actors, while the presence of the strategic goal of land tenure might have been necessary to achieve the involvement of developer actors in the network. The other two goals observed in this period are paved streets and public transport. These two goals were also connected to the rest of goals observed in the period, however, the connection is mediated in its majority by government actors, even when most participants are Neza residents. This could imply that government actors were required for the achievement of all the collective goals, but those of drainage, water supply and land tenure were also linked to the activities of the developers.

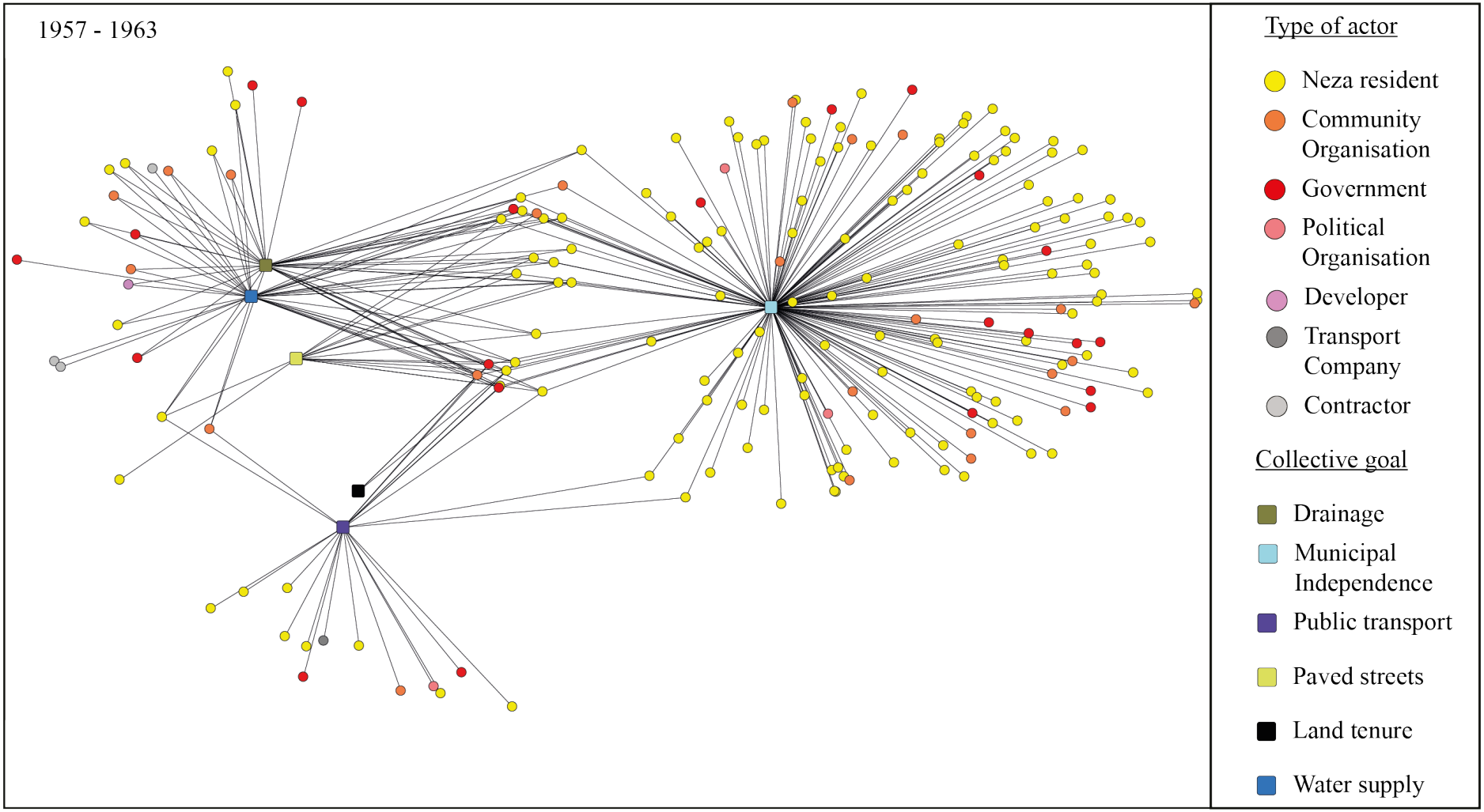
The graph for the period of 1975 – 1981 (Figure 31) shows a reduction in the complexity of the network, if compared with the previous period, even when four collective goals are still present. This period is clearely dominated by the collective goal of paved streets, however, similar to what was observed in the 1957 – 1963 (Figure 29) period in which the network was controlled by the goal of municipal independence, most participants are only linked to the largest goal of the period. While the other three collective goals are rather small they are still connected to the main collective of the period by a number of actors. Out of the three smaller collective goals (water supply, drainage, and public transport), the goals of water supply and drainage appear to occupy virtually the same position in the graph. This is because these goals share almost the same participants. The collective goal of paved streets seems to have a different set of participants, though it is still connected to the others.

The last period observed is that of 1982 – 1986 (Figure 32). The graph shows the decline of Neza's social network, which as previously explained seems to be linked to the achievement of the collective goals investigated in this thesis. The only goal that is present in this period is that of drainage. However, the difference with previous periods is that in this period most of the participants are government actors, which might indicate that the presence of the goal is more related to the operation of the municipality rather than a goal actively being forwarded by Neza residents.

From the graphs, it is possible to note that there are some set of goals that can be understood as complementary to each other by their similar location in the graphs. This is the case of water supply and drainage in most of the observed period; while there are others that seem relevant as they interconnect other demands, having a central position in the graph, despite their low centrality scores, and modest network size. This is the case of the

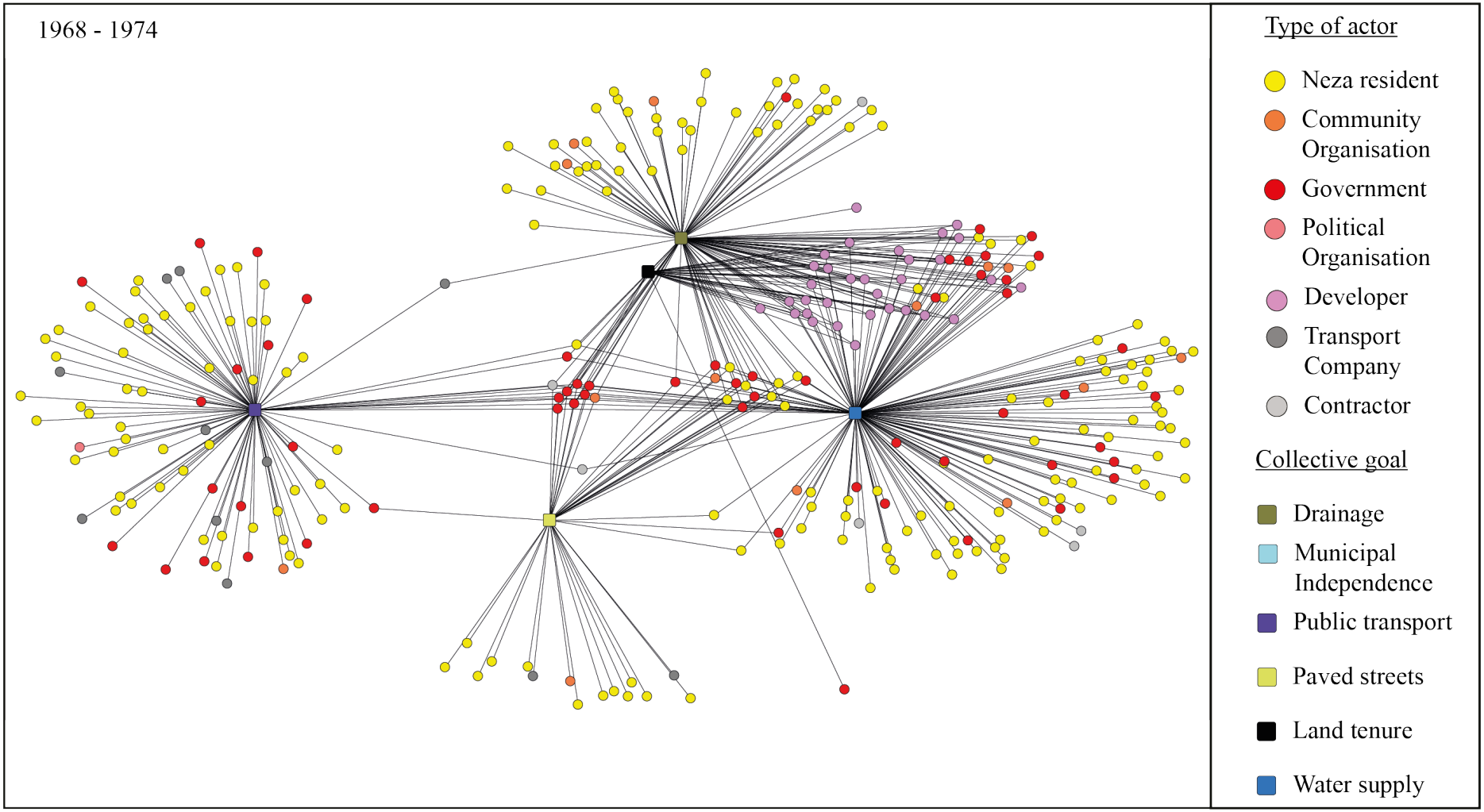
goal of land tenure, which seems to be relevant for water supply and drainage. Other demands seem to be rather independent to the rest, being the case of public transport. However, even distant goals are interconnected with the others through the co-participantion of few actors, showing that the aggregation of goals is important for achieving them. And finally, the characteristic of interconectedness between goals through the actors that participate in them, is only provided by a few number of actors. This might indicate that only few actors were capable to see that the achievement of their collective goals was facilitated by the achievement of multiple goals in tandem, leading to the develompment of the settlement. Achieving collective goals in Neza may have been enabled by the inerconnected nature of such goals, which was only understood and sustained by a reduced number of actors that co-participated in multiple collective goals.

Figure 29. *Two-mode network, actors by collective goals 1957 – 1963*



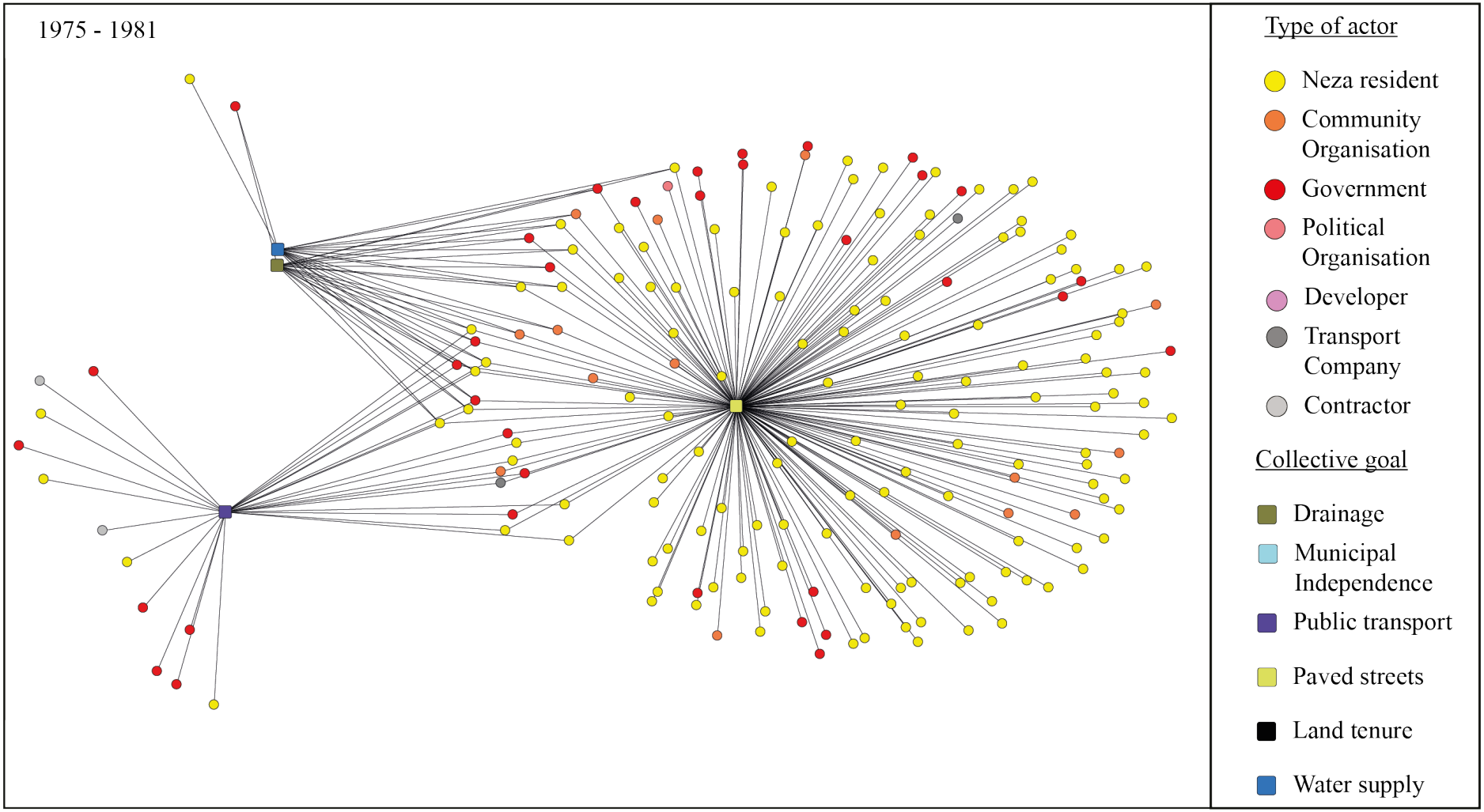
Source: Author's elaboration.

Figure 30. *Two-mode network, actors by collective goals 1968 – 1974*



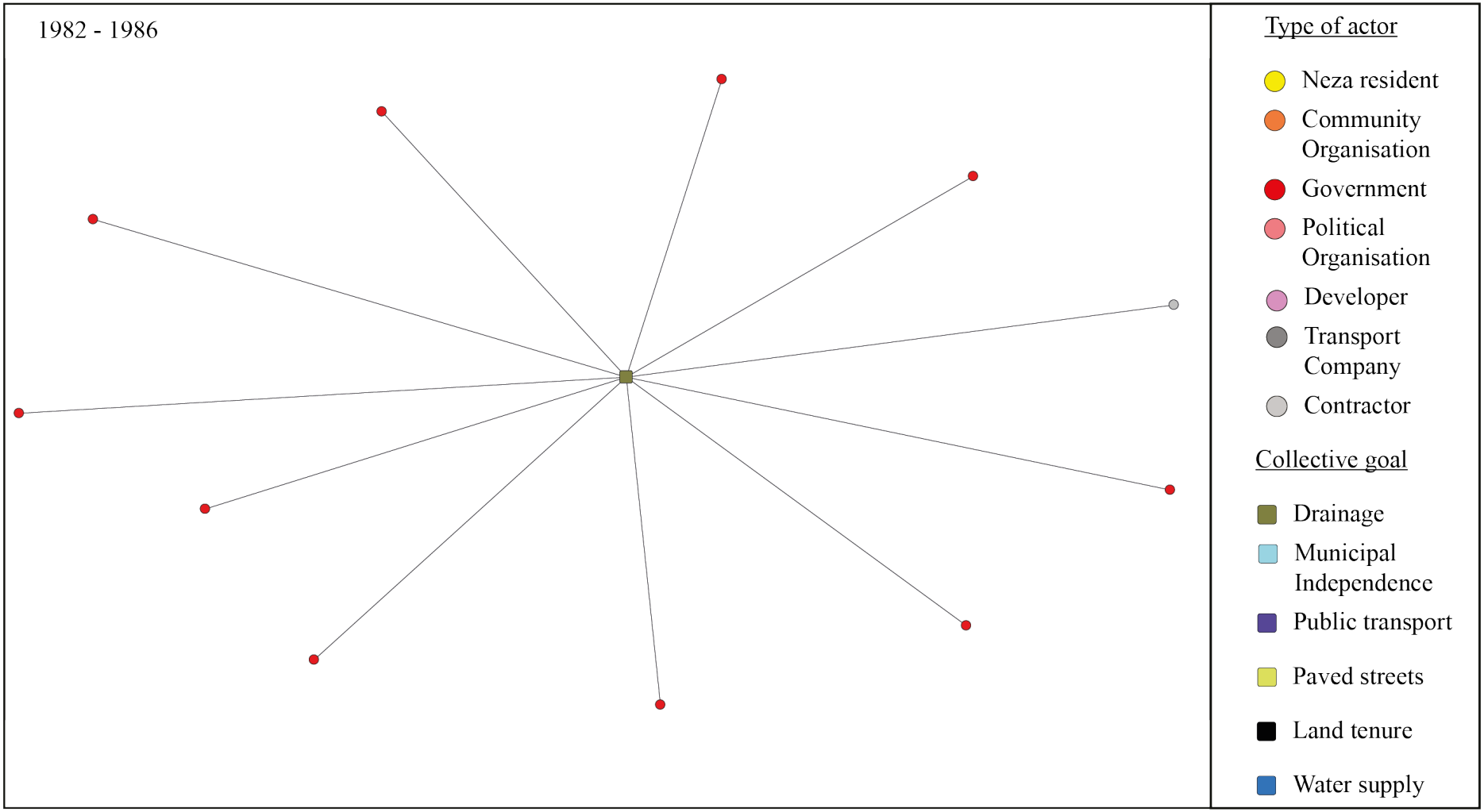
Source: Author's elaboration.

Figure 31. *Two-mode network, actors by collective goals 1975 – 1981*



Source: Author's elaboration.

Figure 32. *Two-mode network, actors by collective goal 1982 – 1986*



Source: Author's elaboration.

6.5 Concluding remarks on the social network of Neza's resilience

This chapter has served to locate and define the main characteristics of the social network that engaged in the achievement of Neza's collective goals. The main argument of this chapter is that the pattern of interactions of a group of 706 actors across the 33 years examined in this thesis formed a social network that operated in the achievement of the collective goals of early Neza residents. Findings of this chapter are the basis for the investigation of the structure of social capital in the context of the achievement of the collective goals of early Neza residents (which is the focus of Section 7.1). The first finding of the chapter is that only one social network of 706 actors participated in the achievement of the six goals investigated in this research. This finding suggests that the collective goals were forwarded by network participants in a coordinated way, in which the achievement of one goal supported meeting other objectives. The second finding of the chapter is that the longitudinal operation of the network was not a linear process in which all of its 706 members engaged longitudinally. Rather, the network demonstrates periods of rapid change, and periods of slow change. Rapid change periods are those moments in which the social network experiences a rapid accumulation of active members, and the network engages in numerous events related to the networks collective goals (water supply, drainage, public transport, paved streets, municipal independence, and secure land tenure rights). Furthermore, rapid change moments are related with the pursuit and accomplishment of particular collective goals: municipal independence (1957 – 1963), land tenure rights (1968 – 1974), and completion of paving street works (1980s). Periods of slow change are the distinctive moments preceding or following rapid change, in which the number of active participants in the network, and the number of events in which the network engages both decrease. These periods are related to the achievement of a collective goal, which implies that network's participants' engagement was justified by a particular collective goal. The interplay of moments of rapid change and moments of slow change has been considered in this chapter as evidence, emerging from the case-study of this research, of the existence of multiple possible stable states of a system as part of the resilience framework.

Third, periods of rapid change follow a particular trajectory consisting of three phases: formation, peak, and reduction of network activities and active members. The common pattern observed in rapid change periods suggests that in the first phase, the network accumulates participants around their collective goals, gathering momentum. In the second phase, the network defines one collective goal, perhaps the most relevant one at the time for network participants. The third phase, reduction of network's activities and active members, is defined by the achievement of the collective goal. After the collective goal is achieved, the number of network participants and their engagement in collective actions decline. The fourth finding of this chapter is that Neza's social network participants were never entirely disengaged. Rather, the network goes through active and latent periods in which it has the ability of activating collective action as required.

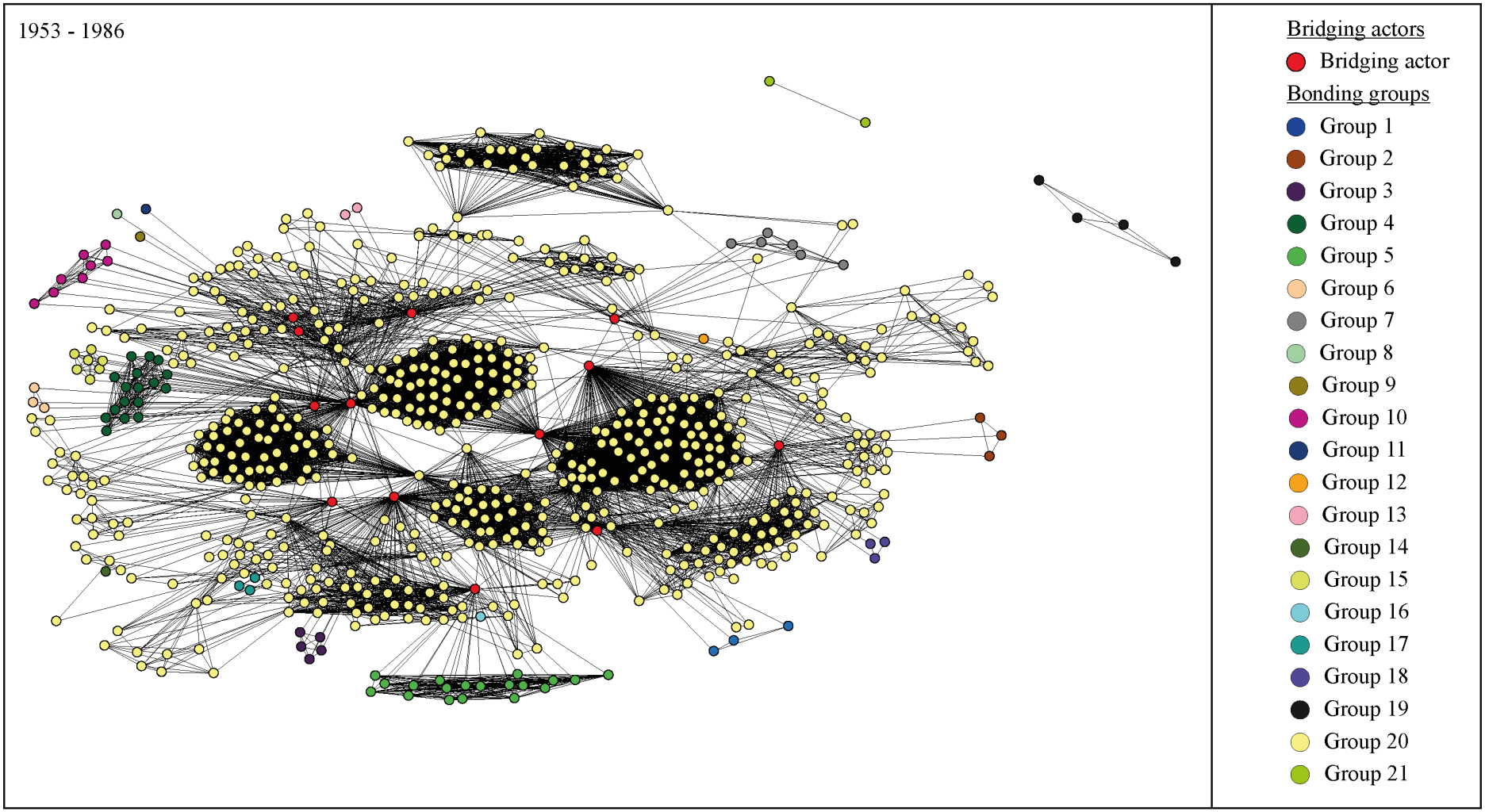
The fifth finding of this chapter is the role that few actors had in sustaining the network longitudinally. This chapter argues that the longitudinal existence of Neza's social network as a single network was sustained by the participation of few individuals across all the periods observed in this research. Individuals whose participation in the network occurred in multiple periods may have acted as bridges, serving as information-passing points about the actions of the network regarding their collective goals, which effectively helped to sustain the network through time. The sixth finding of this chapter is that the periods of rapid change (1957 – 1963, 1968 – 1974, and 1975 – 1981) served the most as passing points between the rests of the periods, measured in terms of betweenness centrality. This means that these periods not only gathered the largest number of network participants, but also that in these periods the largest number of actors participating in multiple periods are observed. The combination of these factors (large number of participants, high participation of multi-period actors, and high betweenness centrality scores) suggests that actions undertaken in these periods were key in sustaining the network longitudinally. The individuals sustaining the network longitudinally, were diverse (i.e. Neza resident, community organisation, government official, political organisation, developer, and public transport entrepreneur). This leads to the idea that the nature of the collective goals of Neza's social network required the sustained participation of a wide range of stakeholders in order to achieve them. Finally, it was found that the presence of state actors in key positions of the network indicate that they had a key role in the achievement of the collective goals of network participants. This chapter has explored the general structure of Neza's social network as a basis for the analysis of the structure of social capital in the context of the case-study. The following chapter builds on the findings of this chapter and uses the theoretical lens of social capital to explore the structure and operation of the social network that forwarded the collective goals of early Neza residents.

7. The social capital of Neza's social network: Structure and operation

The previous chapters have demonstrated the existence of a social network operating in Neza in relation to the collective goals (used in this thesis as embedded units of analysis) and the mechanisms used by network participants to form the network; and have explored the evolution of the network from a longitudinal perspective. The objective of this chapter is to understand the characteristics of Neza's social network from a social capital perspective. This is achieved by examining the two main components of social capital: its structure, and its operation. The network's structure is analysed relying on the method of social network analysis; while the operation of social capital in the network is understood through the thematic analysis of interview evidence collected on the field. This chapter contributes to understanding the structural patterns and the operationalisation of social capital of Neza's social network in the achievement of urban resilience.

The main argument of this chapter is that the achievement of the collective goals of the participants of Neza's network of social capital relied on the ability of network participants to scale-up social capital relations from the local to the extra-community scales. Findings of this chapter suggest that the scaling-up of social capital was particularly relevant at moments of rapid change, which were key periods for the advancement of the collective goals of the participants of Neza's social network. This argument builds on two analyses. On the one hand, the analysis of the structure of the network shows that at moments of rapid change, large groups of bonding social capital are formed, and these groups coalesce between them through the development of ties of bridging social capital. It is in these periods in which a peak in linking relations between Neza residents and government actors is also observed. On the other hand, the analysis of the operation of the network shows that the types of social capital observed in Neza's social network were intentionally developed to achieve specific goals. Relations of bonding social capital were developed to secure family-type relations at the local scale (i.e. support in labour to build a house). Bridging social capital emerged on the basis of the reciprocal sharing of complementary skills and resources between bonding groups, and served to produce social pressure to call for the attention of government actors at the exterior of the community, for the development of ties of linking social capital. The development of linking social capital was used to secure external resources to achieve the collective goals of the participants of Neza's social network. These findings are presented in the following two sections.

Figure 33. *Bridging actors (cut points) and groups (blocks) 1953-1986*



Source: Author's elaboration

7.1 The structure of social capital in Neza's social network

While the identification of the bonding social capital in the structure of social networks can be directly derived from the results of the bi-component algorithm (Stephen P Borgatti et al., 2002), the identification of bridging, and linking social capital is done indirectly. Bridging social capital refers to the connections between different groups of bonding social capital (Durlauf, 2002). Linking social capital refer to the extra-community connections between groups that are unequal to each other in terms of wealth and power (Putnam, 2004; Woolcock, 1998). Structurally speaking, bridging and linking social capitals are equivalent, since linking social capital is a type of bridging social capital (Rohe, 2004; Szreter, 2002). Therefore, the identification of linking social and bridging capital is done through qualitatively looking at the characteristics of the actor who acts a bridge between groups (cut point). Bridging is located in cut-points that tie actors with similar sources of power, for example between two members of civil society. Linking social capital is located in the ties between nodes that have an unbalanced power relation, for example ties between the state and civil society.

Bonding social capital

As previously explained, bonding social capital, structurally speaking, has a similar meaning to that of blocks (bi-components). Here, the general structure of bonding social capital in the structure of Neza's social networks is described. In total, from the aggregate of all the periods of Neza's social network, 21 distinctive groups of bonding social capital (blocks) were identified. The average size of these groups (blocks) is of 34 members, and the median size of the groups is 4 (difference between average, and median values is explained by the presence of a large block of 613 members, and several smaller ones) (Table 14).

Table 14. *Number of groups (blocks) per period*

Social Network	No. of Groups	Group's average size	Group's median size
Aggregate	21	34	4
1953-1956	6	6	3
1957-1963	6	33	4
1964-1967	1	2	2
1968-1974	11	29	9
1975-1981	10	20	5
1982-1986	1	11	11

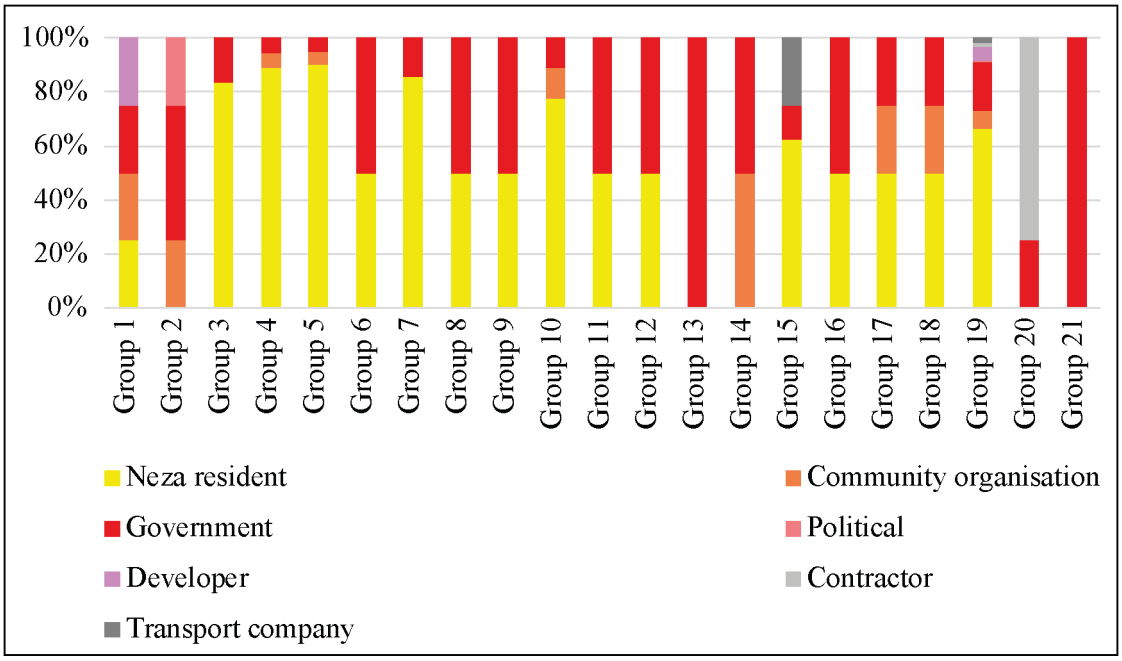
Source: Author's elaboration.

Given that bonding networks are integrated by rather homogenous members, the composition of the identified blocks is relevant. In this sense, it is possible to observe that for the bonding groups present in the aggregate of periods (aggregate in Table 13 is represented in Figure 34), most of the network has a composition in which one type of

actor is predominant to the others. This in turn means that the homogeneous composition of groups is consistent with the definition of bonding social capital. This is particularly evident in blocks 4, 5, and 19 (Figure 34), which are the largest groups in the network (in comparison with the rest of blocks), having 18, 20, and 613 participants respectively. Furthermore, the composition of these groups is largely dominated by Neza residents: group 19 (66% of residents), groups 4 and 5 (90%).

The size of the rest of the groups is much smaller, with an average size of 4 members, which may provide a misleading idea in the composition of the groups. This is because smaller groups tend to have a rather symmetrical composition, at least in the observed data. Groups 3, 8, 9, 11, 12, 14, and 16, have a composition of two types of actors, while the size of each of these groups is two members. Furthermore, the individual presence of these smaller groups in the network, also lacks real analytical value, because their presence corresponds not to a repeated interaction, but to a single participation. However, the large overall existence of this small groups means that some members of the community, and other stakeholders, had an interest in the collective goals pursued, but lacked the capacity or the interest to join others in their demands.

Figure 34. *Composition of groups 1953-1986*



Source: Author's elaboration.

Even when the average number of participants in the documents that served as sources for the location of Neza's social networks was seven, the largest distinctive group is composed by 613 members. This is it because as explained by Rohe (2004) and DeFilippis (2001), social networks emerge from the repeated interaction between members of society; which in the case of the aggregate of periods of Neza's social network resulted in a group (group 19) of a size of 613 members, which represent 85% of the size of the aggregate social network. A similar pattern in which the network is dominated by one

large group is observed in each of the periods here investigated (Table 15), with the exception of the periods of 1964 – 1967, and 1982 – 1986, given that in these periods, only one group is observed.

As it is possible to observe in Table 15, all the periods (with the exception of slow change periods, 1964 – 1967, and 1982 - 1986) present a large group that concentrates most of the participants in the network, gathering between 45 – 91 percent of all actors. Furthermore, in all the observed periods the presence of a dominant type of actor is also evident in the larger groups. The dominant type of actor in most of the periods (and the periods aggregate) is that of Neza residents, whose presence ranged between 66 – 88 percent in such groups. This means that for the overall social network, and for most of the periods, a single block of bonding social capital was responsible of concentrating collective action. This may be an interesting pattern of how large social networks gather momentum in the pursuit of a collective goal.

Table 15. *Group predominance and type of actor per observed decade*

Period	Largest group	Size of largest group	Largest group in the period (%)	Predominant type of actor	Predominant actor in the group (%)
Aggregate	20	613	85%	Neza resident	66%
1953-1956	6	24	63%	Neza resident	88%
1957-1963	5	179	90%	Neza resident	77%
1964-1967	1	2	100%	-	50%
1968-1974	9	158	89%	Neza resident	49%
1975-1981	9	142	73%	Neza resident	71%
1982-1986	1	11	100%	Government	91%

Source: Author's elaboration.

The progression of both the presence of a larger block, and the dominance of a single type of actor in the largest block is also interesting. Mostly, if this trend is compared with that of the evolution of the collective actions discussed in Chapter 6.3, in which it was evident that collective goals followed a trajectory from their formation (1953 – 1956), peak (1968 – 1974), and entry into latent state (1982 - 1986). The data here presented is consistent with this trajectory, and shows that the importance of bonding social capital decreased in periods of slow change in terms of the presence of a larger block, while the increase in the relative importance of government actors taking over the network in the last observed period might be indicative of the decline of collective action sustained by Neza residents.

Table 16. *Groups with only one type of members*

Period	Group	Group size	Type of actor
Aggregate	13	2	Government
Aggregate	21	3	Government
1968 - 1974	5	31	Developer
1968 - 1974	10	3	Government
1975 - 1981	5	2	Government
1975 - 1981	10	2	Government

Source: Author's elaboration.

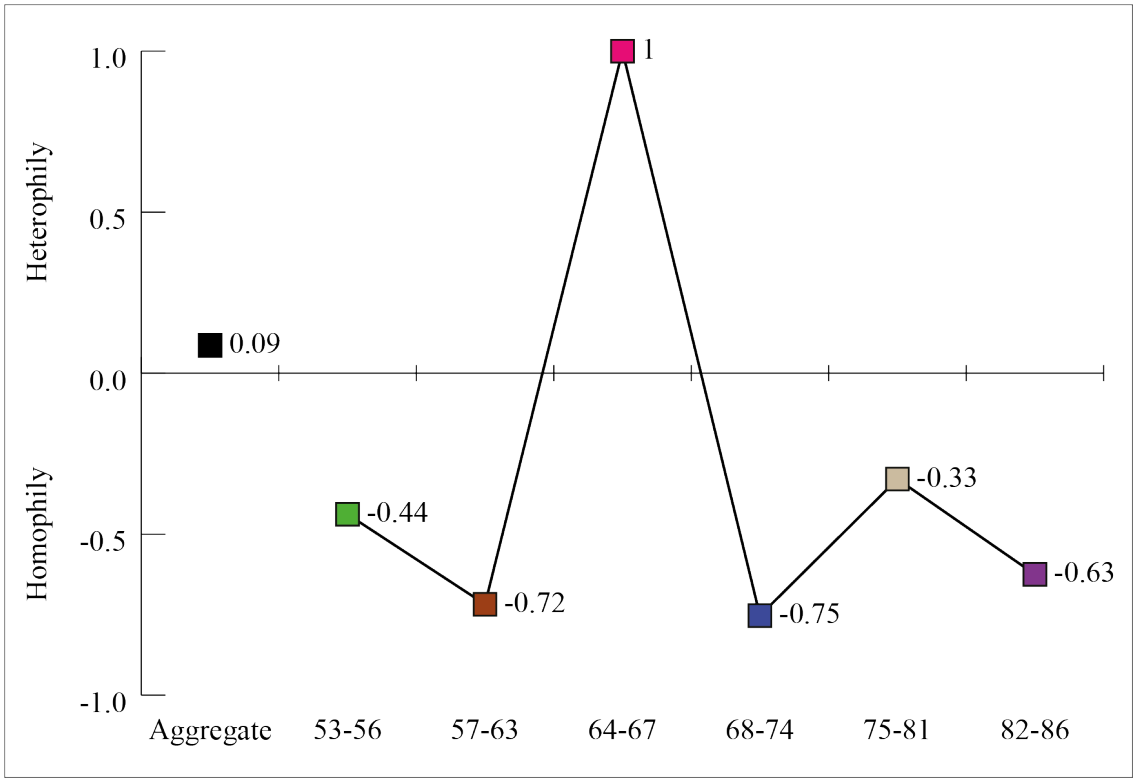
Other groups with an interesting composition are those that only have one type of actors (Table 16). Even when these groups are rather the exception in all of the observed periods, they are important for understanding the network. It is to be noted that none of the groups with only one type of members is integrated by Neza residents, which indicates that certain heterogeneity in the composition of the ties was relevant for the actions of Neza residents. Rather than that, they are integrated by government actors in most of the cases but group five in the period of 1968 – 1974, which is exclusively composed by developer actors. The fact that neither of these groups are integrated by Neza residents exemplifies the exclusive nature of groups with a single type of actor. This in turn might signify that actors in these groups are brought together by their similitudes in terms of their sources of power. This fits Bourdieu (1986) conceptualisation of social capital.

Beyond the type of actors that are predominant in each of the groups of the periods researched in this investigation, it is also relevant to take into consideration the nature of ties between actors in Neza's social network. That is, if the ties present in the network occurred between the same type of actors, or among a diverse set of them. As it was explained in Chapter 3, one way to understand this is by measuring the homophily of a network. Homophily is a measure that captures the nature of the ties between nodes in a network (S. P. Borgatti et al., 1998), which is expressed in a gradient between two extremes: homophily (all ties occur between the same type of nodes), and heterophily (all ties occur between different type of nodes). The measurement of homophily in SNA is expressed as a ratio, limited by two extreme values: 1 (complete homophily), and -1 (complete heterophily). Homophily in social capital language can also be used as a proxy to measure bonding relations in a network, as bonding social capital is the type of social capital that occurs among groups of rather similar individuals. See homophily measures of Neza's social network in Figure 35.

The homophily value for the aggregate of periods of Neza's social network is 0.09. This value is almost in the middle of the two possible extremes (homophily and heterophily). Thus, ties in the network cannot be explained as homophily nor heterophily. This might indicate that, from a longitudinal perspective, Neza's social network collective actions benefited from a balanced relation of homophily and heterophily, that is, a

balanced relation between intracommunity ties (i.e. bonding and bridging social capitals), and extra-community relations (i.e. linking social capital). Nevertheless, when homophily values for each of the individual periods are considered, homophily measures reveal that ties in the network tended to occur predominately among the same type of actors, as this is the case for five out of six of the observed periods (1953-1956, 1957-1963, 1968-1974, 1975-1981, and 1982-1986). The only period in which ties are not defined by homophily is that of 1964-1967. Furthermore, the variation of values through the different periods might shed some light onto the importance that bonding social capital had for each of the distinctive milestones of network actions: network formation (1953-1956), periods of rapid change (1957-1963, 1968-1974, and 1975-1981), and periods of slow change (1964-1967, and 1982-1986).

Figure 35. *Homophily and heterophily values of the network*



Source: Author's elaboration.

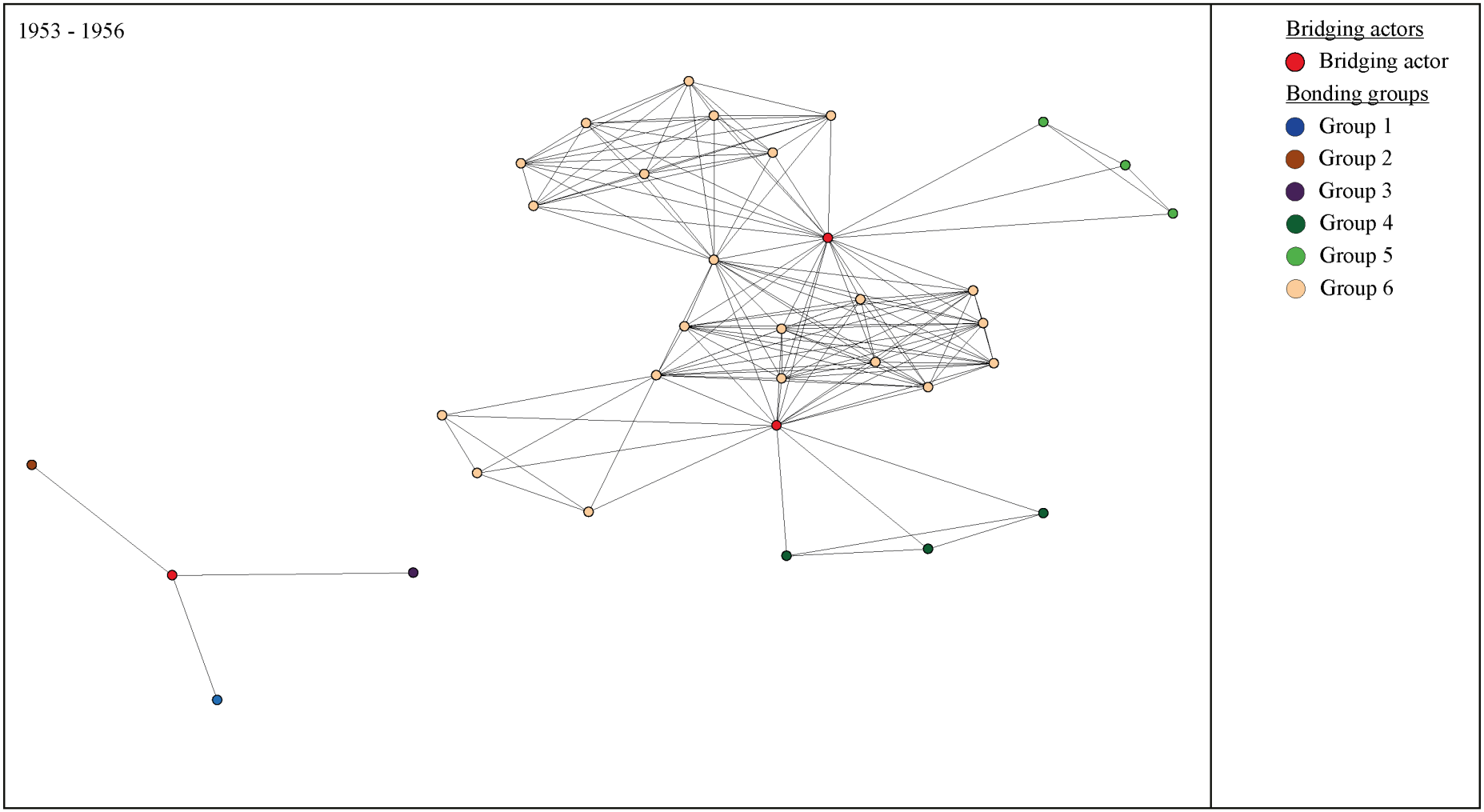
The first period investigated in this research 1953-1956 correspond to the milestone of the formation of the network. This period has a homophily value of -0.44. Ties in this period are explained by having a tendency of occurring among similar types of actors. However, a large proportion of ties in this period are explained otherwise. This means that network participants initiated collective actions relying on a combination of ties dominated by relations of bonding social capital with a large proportion of ties occurring at the exterior of the community. Perhaps this indicates that at this early stage of collective actions, network participants united in bonding groups and at the same time identified that the nature of their collective goals required external assistance.

Periods characterised as being of rapid change (1957-1963, 1968-1974, and 1975-1981), show two distinctive patterns in the definition of its ties. While both of the patterns of network ties of this type of period fall into the category of homophily, a difference of magnitude in value is observed. Periods of rapid change in which strategic collective goals are pursued have the largest homophily values, which also are similar in its magnitude: -0.72 for the 1957-1963 period (municipal independence), and -0.75 for that of 1968-1974 (secure land tenure rights). That is, collective action in these periods was supported by the coalition of large groups of bonding social capital. Nevertheless, the network during this period kept ties beyond the community. This might indicate that the pursuit of strategic collective goals was sustained by large groups of bonding social capital, in which a reduced number of ties at the exterior of the community was necessary to achieve network's collective goals. The second pattern observed in periods of rapid change (1975-1981) shows a smaller homophily value (-0.33) in comparison to the other two rapid change periods. This homophily value is similar to the one observed in the period defined by the formation of the network (1953-1956). The difference in magnitude between the two kinds of rapid change periods might be consequence of the collective goals being pursued. That is, strategic collective goals require a rather large base of bonding social capital to support collective actions, combined with few but strategic extra-community connections; while basic collective goals are also promoted by bonding relations with a wider set of extra-community ties.

Finally, the homophily of slow change periods also have two different values, one that falls into the category of complete heterophily (1964-1967), and the other that its ties are explained by homophily. The only period in which ties are defined as complete heterophily is the period of slow change of 1964-1967, this is it because during this period only one event, involving only two actors (Neza resident A-504, and government actor C-308) was registered. This might indicate that network participants in that period assumed that the achievement of the strategic collective goal of municipal independence would suffice to meet the rest of their goals, and as such the need of large bonding groups was no longer necessary. The period 1981-1982 has a homophily value of -0.63, which means that most of the ties in the network in this period are among the same kind of actors, and thus are ties of bonding social capital. However, it is important to recall that network participants in this period are mainly government actors (10 out of 11), and one is a contractor (I-176). Furthermore, in this period the presence of Neza resident participants is not observed. This is the period in which the collective goals of Neza residents had already been met, explaining why their participation was no longer necessary; while network actions were assumed by the government. Thus, even when ties of both periods fall into the two explanatory possibilities of homophily values (homophily and heterophily), both periods share the absence of bonding relations of Neza residents, this might indicate that Neza residents perceived in these periods that their active engagement was no longer necessary as their collective goals had already been met.

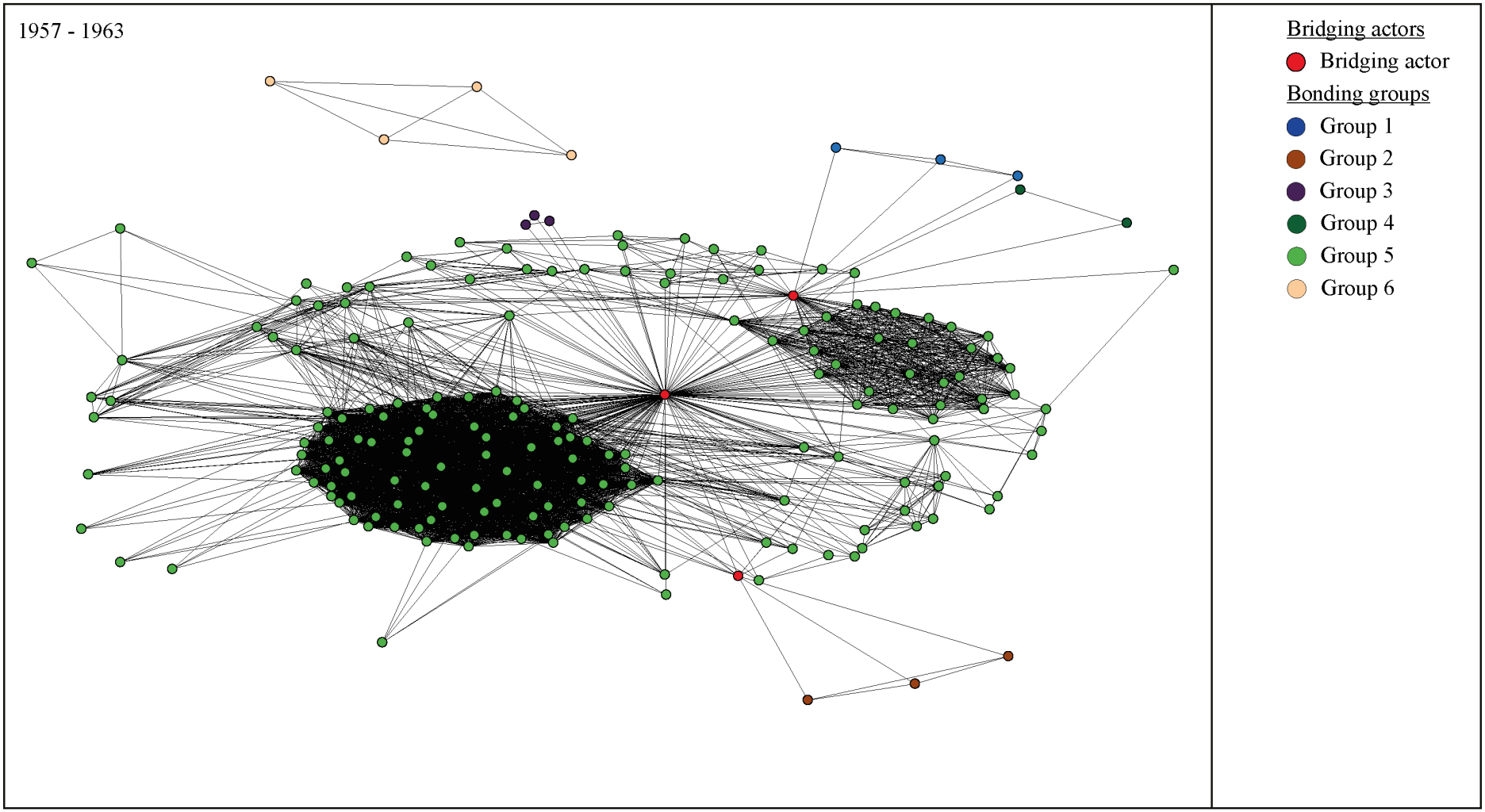
From the observation of the evolution of dominant groups, and the nature of ties within the network (i.e. homophily) through the different periods analysed, it possible to come to some conclusions. Dominant groups are only present in the formation of the network (Figure 36) and in periods of rapid change (Figure 37, Figure 39, and Figure 41). While in moments of slow change, the network comprises only one group (Figure 38, and Figure 41). Then it can be argued that the process of starting and forwarding a collective action relies on the presence of a large and cohesive structure of social capital. The achievement of a collective goal might lead to the transition of these large cohesive structures towards a state of latency, in which the presence of few actors, capable of reactivating the network, is key to reactivate bonding structures in the pursuit of the following collective goal. These observations are supported by the analysis of the homophily of the network through the different periods investigated in this research. Homophily analysis shows that indeed, bonding social capital was most relevant for the formation of the network and in periods of rapid change, as homophily values reach their highest in these periods. In periods of slow change, the presence of bonding groups of Neza residents are not observed, while the presence of government actors becomes more relevant in these periods. The interplay of different homophily values supports the notion that Neza's social network had the ability of activating ties and entering into latent states as required by network members to meet their collective goals.

Figure 36. *Bridging actors (cut points) and groups (blocks) 1953-1956*



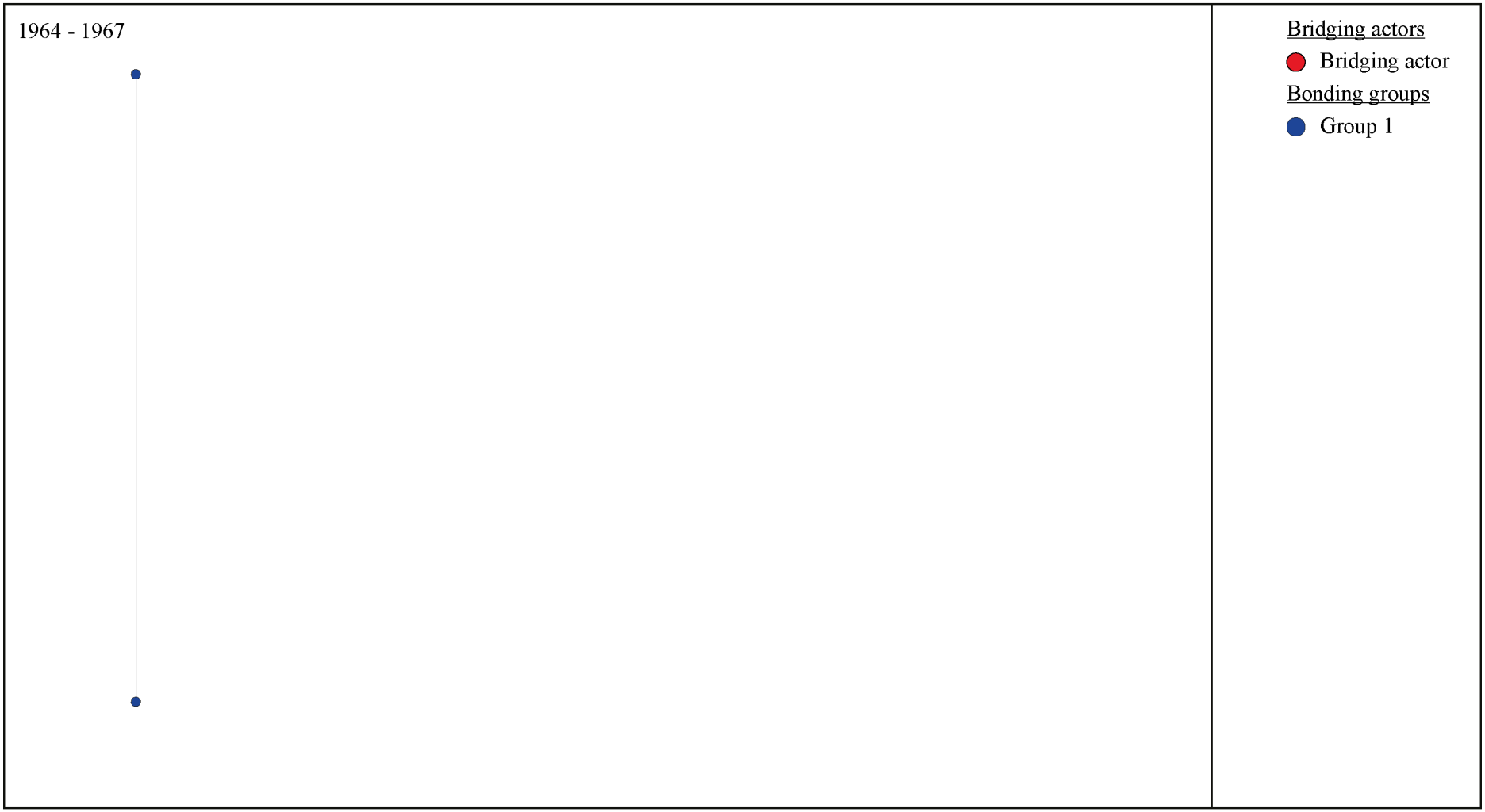
Source: Author's elaboration.

Figure 37. *Bridging actors (cut points) and groups (blocks) 1957-1963*



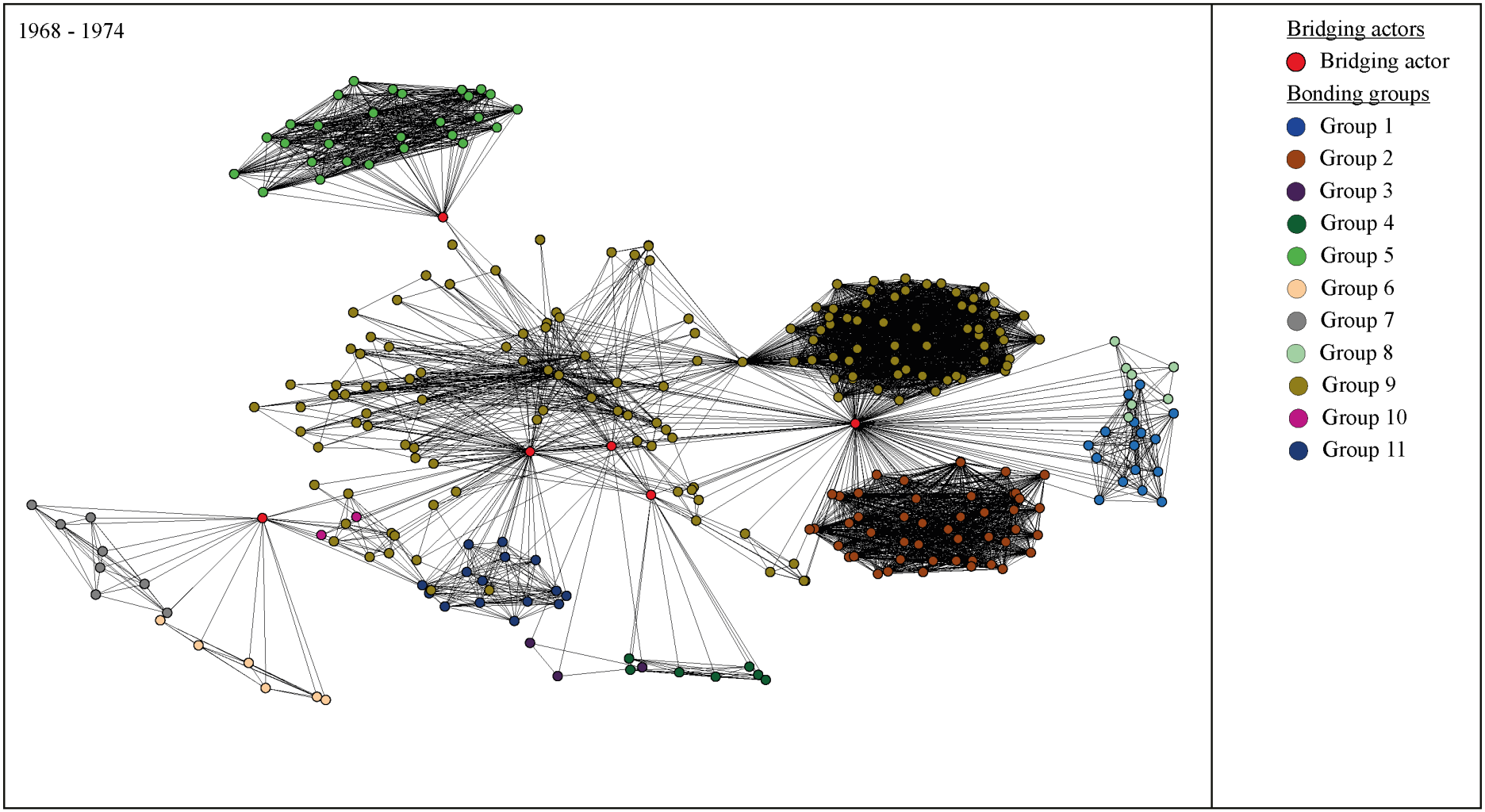
Source: Author's elaboration.

Figure 38. *Bridging actors (cut points) and groups (blocks) 1964-1967*



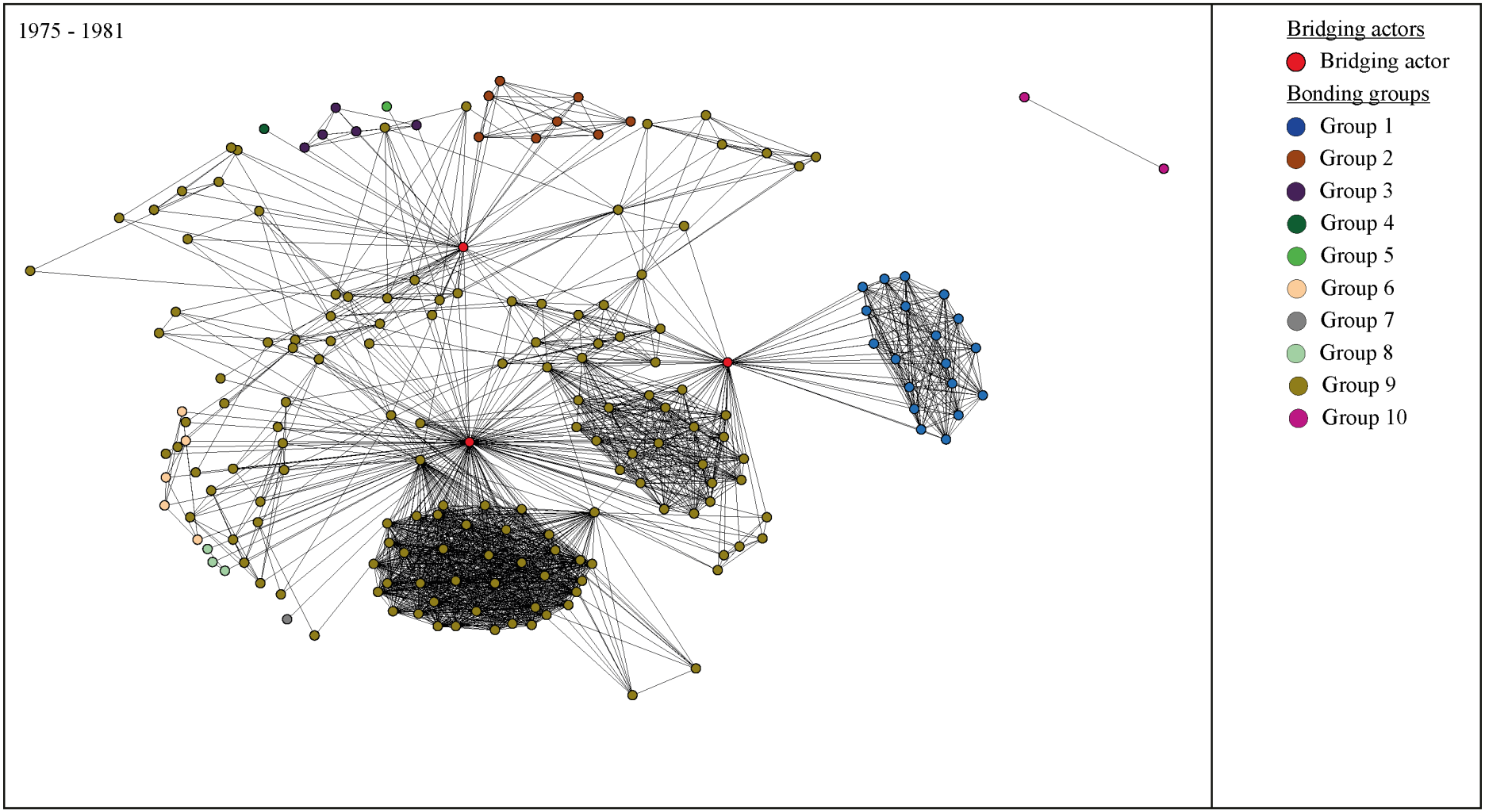
Source: Author's elaboration.

Figure 39. Bridging actors (cut points) and groups (blocks) 1968-1974



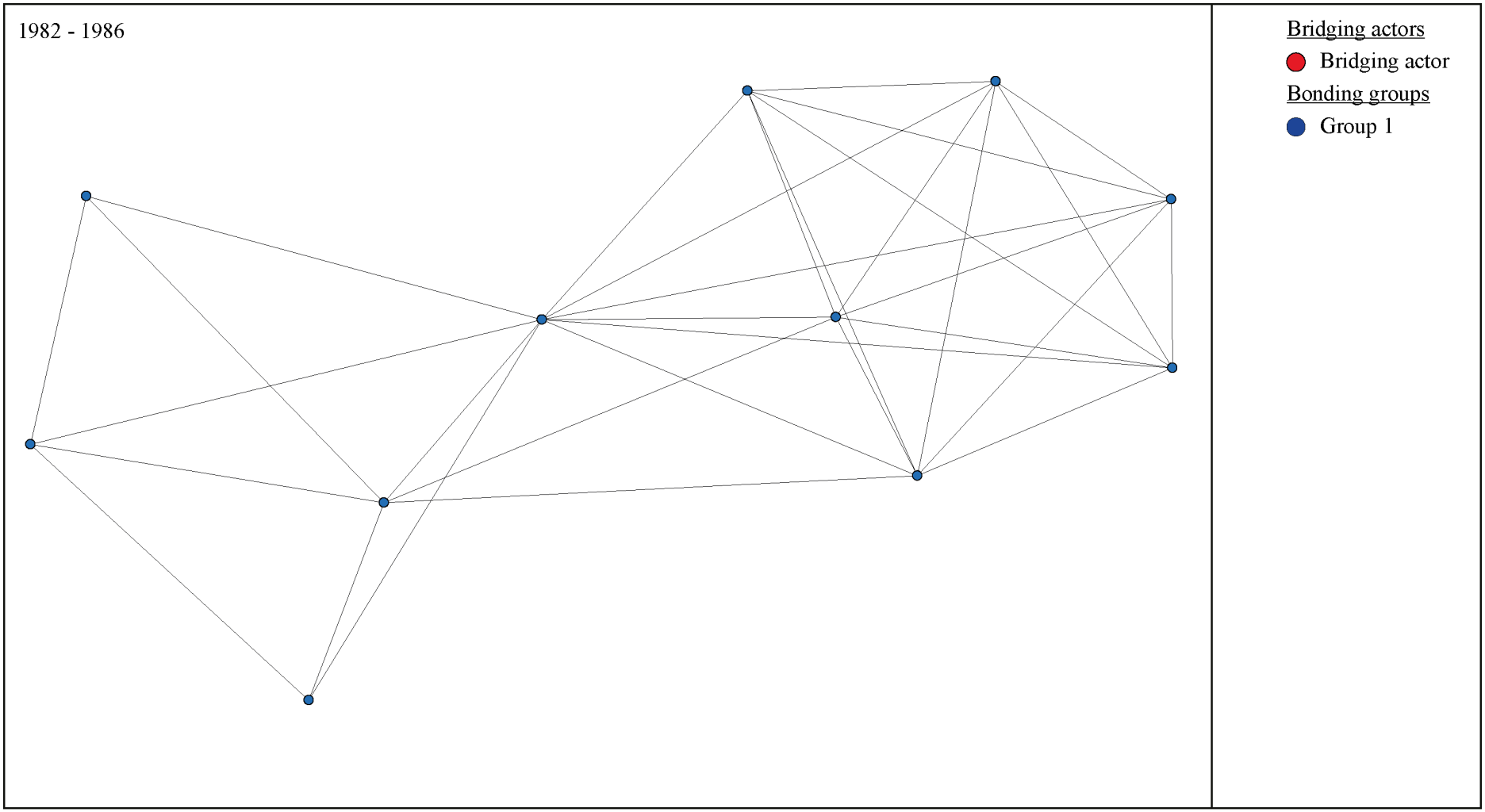
Source: Author's elaboration.

Figure 40. Bridging actors (cut points) and groups (blocks) 1975-198*1*



Source: Author's elaboration.

Figure 41. *Bridging actors (cut points) and groups (blocks) 1982-1986*



Source: Author's elaboration.

Bridging and linking social capital

In this subsection the structural sources of bridging and linking social capitals are explained, and their composition tracked in time. Bridging social capital is the type of social capital that is located in individuals that tie otherwise unconnected dense groups of bonding social capital. Linking social capital is a type of bridging social capital, with the difference that linking social capital is found in ties between groups with unbalanced relations of power (e.g. poor-rich, or community-government). Structurally, bridging and linking social capitals are equivalent, but they can be differenced by the qualitative attributes of such nodes (i.e. government actor to Neza resident is a relation of linking social capital; while a tie between two Neza residents connecting two clusters of otherwise disconnected groups of Neza residents perform a relation of bridging social capital). As it was previously explained, bridging, and thus linking social capitals, can be found in the structure of social networks using the bi-component algorithm in UCINET (Stephen P Borgatti et al., 2002).

In this subsection, the results of computing the bi-component command in UCINET (Stephen P Borgatti et al., 2002) are explained from a social capital perspective. The result is a small number of actors that served as bridges between groups in the observed periods. From the lists of bridging actors, some important conclusions can be reached, by tracking the progression of actors between the different periods and the aggregate of periods.

The first thing to be noted is the predominance of government actors in the number of bridging actors. In total 13 actors presented bridging properties in the aggregate of periods, out of which, 11 were government actors, and only 2 were Neza residents. In all the periods observed in this research, in which bridging actors are structurally present (1953 – 1956, 1957 – 1963, 1968 – 1974, and 1975 – 1981), government actors are the ones that in most of the cases are structurally positioned as bridging actors (Table 17). And it is only in the period of 1953 – 1956 in which Neza residents are located in bridging positions. This period corresponds to the one in which Neza's social network started its collective actions (according to the documents identified for this research). In this period the presence of bridging actors from the community might indicate that in this early stage, bridging social capital was relevant for sharing common information and perceptions across different groups of bonding social capital in Neza, to gain sufficient momentum in the network to pursue Neza's collective goals. In following periods, bridging positions were occupied almost entirely by government actors, which might lead to the idea that once Neza's collective action was started, the achievement of collective goals was related to the construction of linking social capital. It is interesting to note that the absence of Neza residents in bridging positions is not necessarily correlated to a decrease in participation of community residents. Rather than that, the presence of government actors as

bridging actors during the moments of maximum community activity, might be an indicator of government intervention, which might have facilitated social capital and civic engagement (Lehtonen, 2004; Lister, 2015).

Table 17. *List of bridging actors by period*

Actor	Type of actor	Period			
		1953 - 1956	1957 - 1963	1968 - 1974	1975 - 1981
C-652	Government	•			
A-577	Neza resident	•			
A-81	Neza resident	•			
C-331	Government		•		
C-14	Government		•		
C-111	Government		•		
G-248	Developer			•	
C-313	Government			•	
C-113	Government			•	
C-352	Government			•	
C-483	Government			•	
C-555	Government			•	
C-442	Government				•
C-389	Government				•
C-390	Government				•

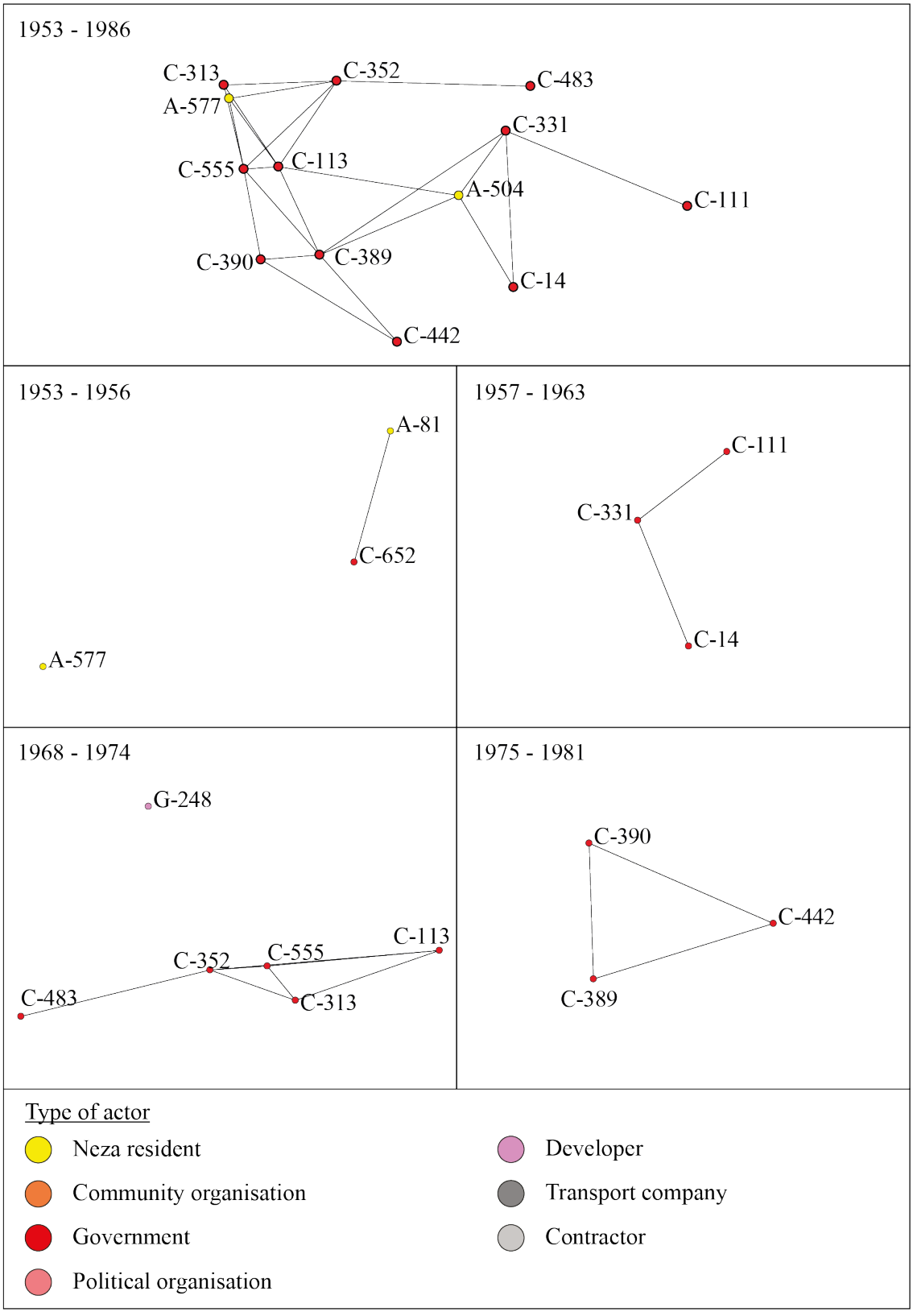
Source: Author's elaboration.

The graphs show how crucial the role of government actors was in amalgamating groups together. This supports the idea of the importance of the state in social capital, while contradicting those arguments suggesting that social capital could be a substitute of the state (Lister, 2015; Lowndes & Wilson, 2001; Szreter, 2002). Furthermore, given the nature of the documents (mostly community petitions) utilised for the construction of Neza's social networks; it is possible to see that the community actively worked to build links with extra-community actors in positions of power. These extra-community actors were strategically selected in terms of their capacity to mobilise the necessary resources to achieve community's collective goals. This assertion is made bearing in mind that community petitions were addressed to specific people, in this case, those that Neza residents considered key to the achievement of their collective goals; thus, they were strategically selected. This is also an indicator of the importance for Neza residents of the construction of ties with actors in positions of power. Perhaps Neza residents identified that by building such relations, they could influence a wider agenda which could help them in the advancement of their own objectives. Thus, Neza residents might have seen in the construction of extra-community ties with government actors a source of power and influence, as theorised by Portes (1998).

Another interesting feature of the bridging actors is that in all the periods observed, with the exception of those of slow change (1964 – 1967, and 1982 – 1986), bridging actors conform a subnetwork on their own (Figure 42). These bridging subnetworks have interesting attributes. In the subnetwork of the aggregate of periods it is possible to observe that government actors and two Neza residents form a closed network structure in which all nodes are reachable to each other in a reduced number of steps. This, on the one hand, may have facilitated the communication between those actors, and on the other hand, may be an indicator of a network based in exclusive power relations, given the type of actors participating (mainly government actors). Closed subnetworks are also present in the periods of 1957-1963, 1968 – 1974, and 1975 – 1981, but in these cases, subnetworks are only integrated by government actors. The only period in which a member of the community was part of the bridging subnetwork was in 1953 – 1956; this indicates that linking social capital, in terms of brokerage between groups, was more relevant at the beginning of Neza's collective actions. However, when seen in its aggregate form, it can be observed that only a few community actors performed as brokers between the community and power structures to forward Neza's collective goals.

To sum up, this section has identified that the presence of linking social capital in the network is strongly related to the operation of the network at moments of rapid change. This indicates that when participants of Neza's social network realised that the nature of their collective goals escaped the local capabilities of the network, they sought external contacts. This occurred in parallel to the reactivation of latent ties of bonding social capital, which accelerates the growth of the network, which in turn, may facilitate the achievement of collective goals. In the following section, the operation of Neza's network of social capital is discussed relying on the qualitative analysis of interview data.

Figure 42. *Subnetworks of bridging actors*



Source: Author's elaboration.

7.2 The operation of social capital in Neza's social network

This subsection presents social capital features as evidenced by interviews analysis. Data collected in interviews provide evidence of the presence of the three types of social capital: bonding, bridging, and linking; in the operation of Neza's social network. Unlike the previous subsection in which bridging and linking social capitals are discussed simultaneously, as both types of social capital are located in the same positions within the network, in this subsection the operation of bridging and linking social capitals are discussed separately. This is because bridging and linking social capitals have distinctive operational characteristics that allow their differentiation (which is not the case from a structural standpoint). This section demonstrates that scaling-up social capital (from intra community ties, to extra-community connections) was used to cope with increasingly complex issues. First, the formation of family and neighbourhood groups allowed network participants to cope with every day challenges (bonding groups); then the coalition of bonding groups into networks of bridging social capital facilitated the process of building linking social capital by reaching actors in positions of power. Finally, building linking social capital allowed the mobilisation of resources for the achievement of Neza's collective goals.

Bonding

Bonding social capital refers to the social norms of trust and reciprocity that emerge among rather homogenous groups (Grant, 2001; Putnam, 2004). It is useful to cope with everyday challenges (De Souza Briggs, 1997). Groups of bonding social capital tend to operate in the context where the group is territorially based (Rydin & Holman, 2004), and are associated with strong intra-group ties and cohesion (Woolcock & Narayan, 2000). The formation of bonding social capital groups happened in Neza, as a result of the common needs and issues that residents shared. Given the low economic base, and the common challenges early Neza residents had to face, local groups of bonding social capital were crucial for the settlement's habitability. Bonding networks were apolitical, and their main role was to address Neza's most immediate challenges.

> *They were not organisations that had a political purpose, but their intention was imminently social, to address and solve immediate and urgent problems. Let's see how we do it with the water, with the electricity, transport... (C-723)*

> *[Collective actions] started in the streets. Because of our needs, the lack of services. The same needs unified us. […] We helped each other reciprocally due to the needs we all shared. So, given the characteristics of the environment. The territory forces you to act in this way, and only together, with organisation and as a group it is possible to make it. (A-717)*

The previous interview extracts provide the general context and purpose in which bonding groups emerged in Neza. First, it is to be noted that the apolitical character of Neza's bonding groups is consistent with Putman's (2000b) interpretation, who places social capital in apolitical organisations. This apolitical character of social capital is only noted in this thesis in the case of bonding groups. Other types of social capital discussed in this chapter suggest a relevant role of political participation of network participants. This could indicate that given that participants of bonding groups have similar resources, politics are not required to realise power and attract external resources (DeFilippis, 2001). The second feature of C-723's and A-717's quotes is the purpose of engaging in bonding groups: addressing immediate and urgent problems. This resonates with the argument made by Light (2004), who argues that inhabitants of disadvantaged communities tend to engage in bonding groups of social capital to improve the conditions in which they live.

A feature commonly considered for the emergence of bonding social capital is the homogeneity of its members, including sharing the same ethnicity (Putnam, 2000b). In the case of Neza, the emergence of strong links happened despite their diversity and cultural differences. As discussed in Chapter 3, the settlement grew due to the migration of people arriving to Mexico City from rural areas of every corner of the country, which given Mexico's cultural characteristics, implies a wide range of ethnic origins. Nevertheless, Neza settlers had to build strong links of trust with each other from the very beginning, suggesting that perhaps the set of challenges that they had to face together were stronger than their ethnic differences. One mechanism that might have facilitated this is the use of an informal institution of fictive kinship that reinforces social solidarity by increasing cohesion within a reciprocal exchange network called compadrazgo. (Lomnitz Adler, 1977). As it is possible to infer from the following interview quote, compadrazgo was used as a mechanism to form bonding networks to address common issues.

> *Obviously, the neighbours were united because of our needs. Because the nature of our coexistence so required it. To the point that […] we all were compadres.40 (A-712)*

This quote illustrates how early residents resorted to the formation of social networks of bonding social capital to cope with their shared challenges. From this quote, it is interesting to observe that the interviewee describes the type of relations that were sustained in the community as 'compadres'. That means that due to the common needs that Neza residents shared, they extended family-type bonds with their neighbours; and as such they expected the kind of help and solidarity that family members provide to each other. This observation is consistent with the observations made by Lomnitz Adler (1977)

40 'In Spanish, a child's father and godfather are, to each other, "compadres" - that is, "co-fathers." "Compadre" is also a traditional term of reverence and friendship for a man. The equivalent feminine term in Spanish is comadre.' (Compadre, 2017)

in her seminal book 'Networks and marginality: Life in a Mexican shanty town', in which she notes that compadrazgo networks are conditioned by social proximity, and as such they develop among neighbours and relatives.

> *There was a brotherhood, it was not like now, that [you only say to your] neighbour "good morning", or not even that... No, no, there was solidarity between all the people. We helped each other. For everything. A collaboration, a cooperation for some necessity... If someone was sick…We all helped. (A-710)*

This interview excerpt (A-710) shows that fictive kinship relations, as framed by Lomnitz Adler (1977), were extended across Neza. Furthermore, the quote shows that indeed, the emergence of a brotherhood-type set of relations among neighbours allowed the formation of bonding groups, which as suggested by Putnam et al. (2004) are relevant to get the support from other bonding group participants to get by in life. From A-710's quote it is to be noted that the interviewee refers to this type of relations between neighbours as something occurring in the past, and that is no longer true in the present. This may be because the kind of resources that were mobilised by bonding groups are no longer required with the same intensity as in the past, due to the improvement of local living conditions. Nevertheless, this type of attitudes of solidarity were widely extended across Neza, and it is largely recognised by the interviewees as the thing that helped Neza overcome its most urgent challenges and helped Neza's improvement overtime. In the context of the case-study of this research, three factors seem to have been highly relevant in the emergence of bonding social capital. On the one hand, bonding social capital was triggered by the common challenges early Neza residents had to face. That is, ethnic differences seem to have been bridged by the set of challenges that early Neza residents had to face together. On the other hand, the emergence of bonding groups was facilitated by the use of informal institutions such as compadrazgo.

Bridging

Bridging social capital is the type of social capital that emerges when different groups of bonding social capital join (Durlauf, 2002), around their common interests through weak extra-community ties (Woolcock & Narayan, 2000). According to De Souza Briggs (1997), bridging social capital allow locally-based groups facing similar issues to build wider networks to forward their shared agenda. In Neza's early years, several organisations of neighbours and merchants were formed; and given that they shared the goal of achieving the construction of the infrastructures that would allow them to overcome the sources of their vulnerability, they joined to pursue their common goals, and support each other's causes. In the words of a Neza resident:

> *[The different organisations joined] out of necessity… Each organisation used to mind their own business, but when it was necessary to push, they pushed all together. (A-385)*

The previous quote shows that while different groups existed in Neza, and each had its own agenda, creating horizontal ties between each other was necessary in order to forward a common agenda. This use of bridging social capital is consistent with the observation of De Souza Briggs (1997), who argues that bridging social capital creates social leverage to forward a common agenda. In the context of Neza, bridging social capital emerged from the interaction between different groups of bonding social capital, which happened to coincide in similar places and situations, making them realise that they shared common goals. It is interesting that these groups joined forces not only to pursue their common causes, but to express reciprocity by participating in each other´s goals. This resonates with one of the main propositions of social capital theorists: norms of reciprocity within networks of social capital, enable participants to act together to achieve common objectives (Putnam, 1995b), and even the objectives of a single group. An example of this can be found in the following interview quote:

> *Interviewee: We found each other... But it was not premeditated, for instance, that we would say: "[lets meet] in an hour, it would be important that we join with so-and-so"... No. Suddenly there was a situation, for example, in this street we started to do something, and someone came from their group, and we asked for their help […]. And they used to come to help us.*
>
> *Researcher: And then you helped them back?*
>
> *Interviewee: Exactly! (C-415)*

It has been theorised that bridging social capital brings together different groups of bonding social capital (Woolcock & Narayan, 2000). In the case of Neza, bridging networks were indeed formed between groups that were different from each other, in terms of their objectives, but groups were also complementary to each other, as they had different abilities or resources, while maintaining a similar background. In the next extract, the interviewee, who was a community leader of a neighbourhood organisation seeking for secure land tenure, explains how his group joined with a student organisation.

> *We made alliances to support our struggle with the student movement, with the independent popular front, those were our allies. They used to come to our committees, we had contact with them. They were from Neza too. The Independent Popular Front was a student committee. They had few settlers as members too, but we were more. Then they used to come to our committee and we also went to theirs. Let's say that they were the intellectuals who guided us a little bit. (A-718)*

As it is possible to observe, both groups were complementary to each other. On the one hand the neighbour's group was large but they lacked sufficient information to guide their collective action. On the other hand, the student organisation had information, but was not big enough to forward their goals. The bridging ties between both groups were beneficial for both parties, as the students organisation gained a greater number of

participants in their activities to create sufficient social leverage to forward their goals (De Souza Briggs, 1997), and the neighbourhood organisation benefitted from gaining knowledge to guide their efforts. The search for complementarity between groups of bridging social capital could indicate that both groups were cashing different potential resources stored in the network, which aligns with Bourdieu's conceptualisation of social capital (Bourdieu, 2008 [1986]).

A common pattern that emerges from the analysis of the interviews, is that smaller groups tend to coalesce with larger ones. Also interesting is that bridging social capital happened in the moments in which the community was preparing to face their strategic collective goals (municipal independence, and secure land tenure). It seems that bridging social capital was used in Neza to gain momentum to forward goals that exceeded the local capacity, and find external help. That is, bridging social capital seems to be of particular relevance as a form of social leverage (De Souza Briggs, 1997) at moments in which strategic collective goals were pursued. The following quote is an example of the latter:

> *The Union of Forces was constituted in this way… First the United Front of Merchants was formed, and when they saw the hustle, the leaders of the colonies [neighbourhood associations] began to adhere, or to join the United Front of Merchants. Because they saw that the movement was strong. […] Then, they began to join forces, and it was then that the Union of Forces was made. (A-708)*

The participants of different bridging groups had a similar background, and were acting collectively for the same goals. However, the differences in size, as a criterion for groups to join another at strategic moments suggests that groups found in the size of the network the source of their leverage. This was perceived as an important factor to forward their collective goals.

The construction of bridging social capital in strategic moments also happened beyond the limits of Nezahualcóyotl. When Neza's groups built links between the different organisations that existed in the settlement to forward the collective goal of land tenure, they also built links with the people of Chimalhuacán. This is a relation of bridging social capital because both communities had similar sources of power. They were grass-root groups of bonding social capital, with low access to political representation, and the both of them suffered the effects of exploitive relations with the same stakeholders: the government and the developers. This resonates with what De Souza Briggs (1997) proposes: bridging social capital emerges when locally-based groups coalesce with other groups that face similar problems, ideologies and political regimes to build wider networks and forward their common agenda.

By building extra-community links (Woolcock & Narayan, 2000) with the people of Chimalhuacán, who were actively attacking Neza residents, Neza residents tried to stop the attacks by reaching a mutually beneficial agenda. Neza residents needed to

achieve land tenure rights, and to do this, they needed to convince Chimalhuacán to rightfully sell their lands, as the first presidential order that allocated the property rights on the lands of Nezahualcóyotl benefited Chimalhuacán. On the other hand, Chimalhuacán needed to get the payment for their land. Thus, both communities united in the pursuit of their joint interests.

However, due to a long-lasting resentment between the two communities, building bridging links was a difficult endeavour. And unlike other links of bridging social capital described above, that emerged from the natural interaction of organisations, links with Chimalhuacán were actively sought by Neza's social networks, and actively resisted by Chimalhuacán people. Information about the process of construction of collaboration links was only provided by a handful of interviewees. This is because only a small group of Neza leaders were assigned this task. However, interviewees who referred to this process (A-557, A-668, A-65, and A-668) do it in the same terms, describing the same actors involved, and difficulties experienced. The following extract illustrates the complicated process that Neza leaders had to undergo to attempt building, what they considered to be a strategic relation to reach the goal of land tenure.

> *No, to meet [the leader of the Chimalhuacán commune] it was a problem. We had to go, I do not know how many times. And the times we went, we could not talk to her because they denied it to us. Until one day, at last, we talked to one of her sons. And that's how we talked about the whole situation. Then he said, "well, I'll expect you to come that day and I'll be waiting for you". This is how we could talk to her. And we introduced her to the Agrarian authorities41 and they started to call her and the lawyers started to work. But I'm telling you, this was a somewhat critical situation, because that way we were able to achieve the transformation of Nezahualcóyotl. The regularisation (A-668)*

The emergence of bridging social capital in the context of Neza seems to have had as its main objective, building wider networks to boost social leverage for the pursuit of Neza's collective goals in a more productive way. Beyond this, networks of bridging social capital in Neza were established under the basis of mutually beneficial relations between participating groups in terms of complementarity of resources or abilities. Furthermore, bridging relations were of particular relevance in moments in which Neza's social network pursued strategic collective goals.

Linking

Linking social capital is the type of social capital that explains vertical extra-community connections between locally based groups and people in positions of authority (i.e. Neza residents and government actors) (Woolcock, 1998). The challenges that Neza

41 One of the key institutions involved in the network was the Department of Agrarian Affairs and Colonisation (*Departamento de Asuntos Agrarios y Colonización*). Which was the institution that regulated the use of rural land in Mexico at the time of Neza's collective actions.

residents faced during the period of time studied, were bigger than the capacity of the immediate collective action of Neza's networks of bonding and bridging social capital. For this reason, Neza's social network had to look for the cooperation of actors beyond the community, with greater sources of power than theirs, and with access to the kind of resources Neza was lacking. Thus, the formation of linking social capital was actively sought by Neza residents. Linking social capital was formed in the moments in which Neza residents were forwarding their strategic collective goals: municipal independence, and land tenure. Neza residents identified the links with government actors to be necessary to mobilise the resources to help Neza achieve its collective goals.

The first moment in which linking social capital was actively sought was during the pursuit of the first strategic collective goal: municipal independence. In this moment, Neza's network identified that in order to achieve their basic collective goals, it was necessary to overcome the patterns of provincial governing of Chimalhuacán by creating their own political representation. The objective was to achieve an accountable political representation able to forward Neza's interests. This resonates with the idea that poor communities, in order to develop, need to change the imbalanced power relations that hamper their progress (DeFilippis, 2001), for which the presence of groups able to understand and challenge uneven relations is necessary (Harriss, 2002). The following quote exemplifies this idea, in which interviewee C-423 stresses the need of achieving the collective goal of municipal independence in order to acquire the necessary political representation to harness the achievement of Neza's collective goals.

> *In the first place, it is logical that those who lived here, in what were the colonies of the Texcoco-lake, having no services, had to find a way to get them, one way or another. And who would grant them? Well, the government! There are no charitable souls who would say, "I will pave a neighbourhood, I will introduce the drinking water". No, it's the government, because it's also its responsibility. Thus, it had to be reclaimed to the government. But it is not the same, pardon me the expression, to be the tail of the lion than the head of a mouse. And having our mouse head was achieved by being a new municipality. The community was represented by the municipality elected by the people, they had all the authority, and the strength of the people to go with the governor, with the president of the republic. Even with international bodies to seek support to meet our needs. (C-423)*

From the previous quote it is possible to see that the purpose of creating an independent municipality was to build relations with extra-community actors in positions of power, thus, connections of linking social capital. As previously described, Neza's social network joined into a large network of bridging social capital (Union of Forces). However, to catch the attention of key government actors (the state's governor and the state's congress), Neza's network became political. This enabled the construction of links between Neza's network, and actors in positions of power; which entailed the affiliation

of Neza's social network to the governing party. The following two extracts show that the politicisation of Neza's social network explicitly aimed to facilitate the construction of connections with actors in position of power, which can be explained as the construction of linking social capital.

> *Interviewee: At the beginning, one of the first organisations was the Union of Forces. The Union of Forces was part of the PRI's popular sector. At that time there was no other party than the Institutional Revolutionary. Then, one of its sectors, which surely you know, is the popular sector, the so-called CNOP. So the Union of Forces was the organisation of the people, so to speak, that joined the popular sector of the PRI, and from there the great political, social battles of the municipality were fought.*
>
> *Researcher: Why did they ally with the CNOP?*
>
> *Interviewee: Look, I think it was a matter of convenience, because the popular sector was part of the Institutional Revolutionary Party, which even today still governs the state.... Well it was convenient, because [it facilitated] the relationship between the state government and the organised people. (A-720)*
>
> *Because… as it was the only party, being part of this unique party was the most appropriate way to reach those in charge of the state government. To get attention, a little more immediate. That was it. Why, because there was a direct contact through a federal deputy... At first there was no deputies in Nezahualcóyotl, they were from elsewhere. […] Then, through them, we managed to reach the governors and the institutions that provided the services we were requesting. (A-717)*

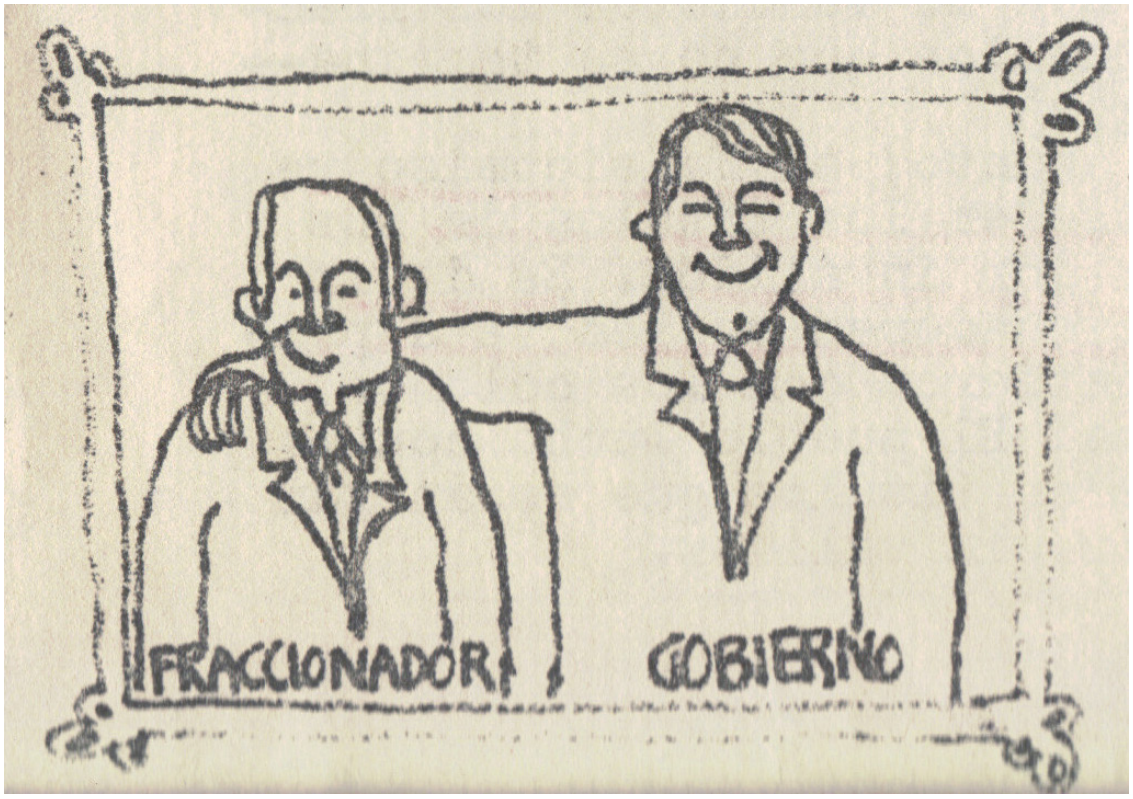
While the political use of social capital has been largely overlooked by some of social capital's theoretical proponents, notably Putnam (2000b), the politicisation of social capital in the context of Neza facilitates the construction of linking social capital. The politicisation of networks of social capital supports the arguments made by Szreter (2002), Harriss (2002), and DeFilippis (2001) when they stress the need of recognising the role of politics in social capital, in contrast to Putnam's (2000b) propositions. In the context of Neza, the politicisation of the social network was particularly important as the control of agendas and resources was held by political actors. In Neza, groups of bonding and bridging social capital needed to participate in politics to facilitate the achievement of their collective goals.

Once Neza's social networks achieved their collective goal of municipal independence, the linking relations built through the political affiliation of networks to the governing party remained. However, as explained in the section of institutional challenges in Chapter 5, the newly formed municipality did not represent Neza's interests, as its control remained in the hands of extra-community actors. This means that the ulterior objective of the independence of the municipality (the basic goals) was not achieved. For

this reason, a second strategic goal (land tenure) was undertaken by Neza's networks. Even when the goal was to achieve secure land tenure for Neza's settlers, this was done as a strategic move to remove the source of power of the developers, who were the ones that controlled the municipality after its formation, making it unaccountable to Neza inhabitants. To meet this goal, Neza inhabitants had to build new linking relations, because the former ones were not useful, since there was a collaborative nexus between the developers and the municipal and state's governments (Figure 43). The coalition between developers and the government opposed the collective actions of Neza's network, to the point of using the force of state and municipal police to repress it. This is exemplified in the following interview extract:

> *We started to make assemblies, and that is when the [police] repression started. Because the government was at the service of the developers, there were a lot of interests. Here it was a fight between our poverty and their wealth. It was a completely unequal struggle. But thankfully, General Lázaro Cárdenas helped us. The fight is like that, through investigating, we got to Lázaro Cárdenas, he protected us, he helped us. He wrote a letter to Guadalupe Zuno, Echeverría's father-in-law, father of Esther Zuno. (A-628)*

Figure 43. *Developer (fraccionador) and government (gobierno)*



Source: El despertar del pueblo [The awakening of the people] (1973)

The previous excerpt shows the active role that some government actors and the developers had in trying to disarticulate the collective actions of Neza's social network. This echoes the observation made by Fox (1996), who identified that the Mexican state

regularly uses the 'force to deny indigenous Mexican communities the opportunity to scale up and form organizations of sufficient scale to defend their interests' (Fox, 1996, p. 1091). The quote also makes reference to the necessity that Neza's network had to build new relations with actors that out-powered those opposing its actions. The previous extract mentions four extra-community actors that the interviewee perceives as relevant: Lázaro Cárdenas, Guadalupe Zuno, Luis Echeverría, and Esther Zuno. Lázaro Cárdenas was president of Mexico (1934 – 1940) and is widely recognised as one of the most prominent political figures in Mexican history. He remained highly influential in Mexican politics until his death in 1970. Guadalupe Zuno was another main political figure in Mexico. He served as presidential advisor in Cárdenas' presidency. Most importantly, he was also father of Esther Zuno, who was married to Luis Echeverría. Luis Echeverría was minister of the interior (1963 – 1969), and president of Mexico (1970 – 1976). This means that by the time Neza's social networks were forwarding the collective goal of land tenure, Luis Echeverría was a very powerful man, second in command of the Mexican government, and as candidate of the state's political party for the presidency of the republic, he was about to become the country's most powerful politician. Thus, Neza leaders were building political links with the most powerful group of people in the country. The empowerment of Neza's social network echoes Szreter's (2002) observations made on his alternative lecture of Putnam's work, in which he notes that the empowerment of marginalised groups is facilitated by cross-class alliances between local groups and governing classes.

These actors are mentioned in various interviews. However, only a few of the interviewees described them as being a fundamental part of the network they built to advance their collective goals. This is explained by the reduced number of people that participated in the construction of those connections. These interviewees (A-65, A-557, A-628, and A-668) also described the mechanisms they used to link with some of the most influential actors in Mexico in the 1970s, and the resources they obtained by doing so. According to the interviewees, the linking process was facilitated by a mutual acquaintance of one of Neza's settlers, and future president Echeverría: former president Cárdenas. According to the interviewees, one of the residents of the settlement was a former military who happened to be part of Cárdenas' security guard when in office. This former military introduced a group of Neza's leaders to Cárdenas. Then Cárdenas served as liaison between Neza and Echeverría in two ways. First, Cárdenas phoned Echeverría on behalf of Neza's leaders. Second, he wrote a letter to one of his former collaborators, Guadalupe Zuno, on behalf of Neza's leaders. Despite the sequence of the events, as told by the four interviewees (A-65, A-557, A-628, and A-668) being confusing, all of them coincide in describing the benefits they obtained: novel information, end to the repression, legal representation, and the promise of a solution to Neza's problematic.

> *The presence of an old man appeared. Just like my age, or older than me. It happened that he was a retired military. And that this retired military man was one of General Cárdenas's guards when he was president of the Republic. And that*

fellow, here is his photograph... […] It is understood, I do not know to what extent, that he was close to the General when he was president of the republic. He started to come to our meetings and began to tell us the story [of Neza's land property]. (A-65)

This quote, illustrates the importance of the role of brokerage that one of Neza's residents played to access actors in positions of power, using the weak ties that he had by being acquaintance with one powerful actor (Granovetter, 1973). Also, this quote presents evidence on how social networks obtain novel information relevant for their causes. In this case, the former military was aware of the fraudulent nature of Neza's land sale, and he used the social network he belonged to, to socialise this information. When the group of Neza's leaders visited Lázaro Cárdenas, Cárdenas phoned Echeverría. Despite the fact that the content of the call cannot be corroborated, according to one of the members of the community (A-65) who was part of the meeting, Cárdenas called Echeverría asking him to solve Neza's problems:

We went to meet General Cárdenas. [The former military] got us the appointment. When we talked with the General, [he told us]: "I know what the issue is". He knew it already. He was president, and even when his time in office was over, [Neza's] conflict was there since Plutarco Elías Calles [presidency (1924 – 1928)]. Then, the General asked his assistant to contact Luisito [diminutive for Luis Echeverría]. At the time [Echeverría] was the candidate. And when the communication was ready, they gave him the phone. They exchanged greetings. And then Cárdenas said "Luisito, how are you? I'm calling to say hi. And to let you know that I'm with the people of Nezahualcóyotl. I want to ask you to help them. I want you to meet them and listen to them". (A-65)

The result of this meeting was, according to the four interviewees (A-65, A-557, A-628, and A-668), a temporary halt to the repression of Neza's collective action, and two recommendation letters written by Cárdenas to support Neza's collective action addressed to two prominent figures (Guadalupe Zuno and Luis Echeverría). However, repression resumed after the death of Lázaro Cárdenas in October 1970:

When Cárdenas passed away, the repression was very strong. But since we already got the letters he had sent to José Guadalupe Zuno, we went to Guadalajara [where Zuno lived]. (A-628)

Then, Neza's social networks decided to take the Cárdenas' letters to Guadalupe Zuno, who referred them back to Luis Echeverría:

We went right away to Echeverría's house. When we got there, only his wife was at home, Mrs Esther Zuno. […] [She told us]: "when Luis assumes the presidency, I will let him know, and we will solve that issue." And she assigned two lawyers from the General Attorney's Office [to help us]. […] With that we came back sat-

isfied [to Neza], and we started to negotiate with the agrarian department [at the federal level]. [The lawyers] connected us there, and we started the negotiation. (A-668)

One of the results of building linking relations was that Neza's social network got resources that were beyond its means: legal representation. And by getting this, they started to legally defend themselves from the repression they were suffering from municipal and state's authorities. And finally, they obtained the promise that Neza's problematic was going to be solved once Echeverría assumed the presidency. In the meantime, police repression from both municipal and state levels continued in an attempt to dismantle Neza's collective actions. This pushed Neza residents to use demonstrations as a strategy to make themselves listened to. According to Welzel et al. (2005), demonstrations are an expression of the effectiveness of social networks in producing collective action that confronts power from below . According to interviewees A-557 and A-628, they first forced presidential candidate Echeverría to take their list of demands in a campaign act celebrated in Neza, which helped Neza residents to keep advancing their demands at the highest political level.

Echeverría came here, to the main square… I took the microphone… I hid behind, and when he finished… When the candidate finished his speech, I was already standing in front of him. I was holding my folder, and I gave it to him. The police was already pulling me down, and I hug the candidate as hard as I could. They kept pulling me anyway. At the end I was grabbing tightly one of his legs, and I didn't let him go. […] We talked about how necessary his intervention was. Because in Toluca [capital of the State of Mexico], they had a lot of vested interests with the developers. I told him: "if you help us, this is going to be solved." Then we went to Los Pinos [Los Pinos is the Mexican equivalent to the White House]. (A-557)

However, repression from the municipal and state governments continued for another two years, along with an unwillingness from municipal and state governments to receive Neza's leaders, and much less to tackle Neza's problematic. The difficulty of reaching accountable government authorities forced Neza residents to keep demonstrating. And since they were not being listened to by the tiers of government (state and municipal) that supposedly were responsible for Neza's situation, then they tried to reach higher authorities. This is explained by one of the interviewees, who participated in such demonstrations:

It was very difficult because the authorities did not want to receive us. Because they said that we were some troublemakers, that we caused uproar. They did not want any problems. Then it was difficult. We had to go looking for an authority who understood us, and received our petitions, our request. But a lot of us used to go, in mass, so we could to be heard. We made several fasts there in the Zócalo

[the main square of Mexico City]. There we went because they did not want to receive us and we had to make fasts in the square. There we were many people. How many? About 3000 people, to be received by President Echeverria, he was president at that time. And in Toluca too. Until we were received by the Professor [the 'Professor' was the governor of the State of Mexico]. Because all those who had money, the developers, used to go there to say that we were invading. And it was not true, because many people had sold [land] to us. (A-725)

According to most interviewees, at this stage, there were two peak moments that helped Neza's social networks to finally mobilise the external resources needed to tackle Neza's problematic. One is a massive demonstration in Neza that was violently repressed by the state's police. And the second is that as a result of this demonstration, Neza's networks decided to do a follow-up demonstration in the Federal Chamber of Deputies [lower house of congress], to call for the attention of another branch of the federal government.

Interviewee: On that date, 21st of March of 1972, there was a massive demonstration. On the 27th, we reached the agreement to go to the Chamber of Deputies [lower house of congress], to demand the presence of the governor of the State of Mexico, and we did it.

Researcher: Why did you demand the presence of the governor?

Interviewee: Because he was an accomplice of the developers. He did not give us the services. He did not give us land tenure. He imprisoned us. He sent the police to repress our meetings. So, what was the matter? Where was the justice? Hence, we went to denounce him… I got into the Chamber of Deputies. Hugo B. Margain had just finished his report on the finances of the nation, and while he was leaving on one side, I entered from the other side. I got to the tribune, and I took the microphone. It was open. So, I started screaming. I said: "congressmen, bon appetite, while in Nezahualcóyotl the living daylights are beaten out of us, here you are, drinking coffee… We demand the removal of the government of the State of Mexico, because they are accomplices of everything that is going on…" As I was just finishing this phrase, I felt a big hand grabbing me, and they took me out… Several [guards] took me out. They were whispering all kind of things to me… And when we got to the doors, a deputy was there. He told the guards: "Hey, give him to me!" […] That was useful because a few days later, we got called by the government of the state, through the deputy. The deputy represented Nezahualcóyotl. We told the deputy that we wanted safe passages from the congress to go [to Toluca], otherwise we would maintain the revolt. He gave us the safe passages from the Congress of the Union. There were 37 of us. After what happened in the

Congress, they called us. So, I take it for granted that if I hadn't come into Congress to denounce the government, made all that hustle with the rest of the comrades, and what happened on March 21st, things wouldn't have improved. (A-65)

It is interesting to note that there are two types of collective action in Neza's acts: one that is massive and involves the participation of the whole community, and another that only involves a reduced number of community participants. It is also important to note that massive events reinforce smaller ones, while smaller events are key actions that follow massive ones. This seems to be the strategic collective behaviour that Neza's social network used to advance its collective goals. From the previous passage, it is also possible to see a relation of trust and reciprocity that emerged from the events in the Chamber of Deputies: in exchange of stopping this kind of demonstrations, the deputy offered safe passages and access to a dialogue with the state's governor. Perhaps, demonstrations as indicators of the effectiveness of the network to produce collective action (Welzel et al., 2005) was used as a mechanism of social leverage (De Souza Briggs, 1997) to facilitate the construction of linking connections.

According to the accounts of interviewees, as a result of these actions, in 1972 the state's government shifted its policy to one that acknowledged Neza's demands. And, during 1972 several meetings organised by the state government were celebrated in Neza, under the format of open town hall meetings. In these meetings, the state's government also called for the participation of every government agency (federal, state, or municipal) relevant for the solution of Neza's problematic. Evidence of these meetings was recorded in official documents (Acuerdos sobre los asuntos tratados en las juntas celebradas en Ciudad Neza servicios públicos 1973 [Agreements on matters discussed at the meetings held in Ciudad Neza public services 1973], 1972-1973). These were collected in the stage of archive mining, and were used to inform the social network analysis presented in Chapters 6, and 7. During these meetings, social needs were recorded, and agreements for their solution reached between all relevant stakeholders, thus effectively mobilising the necessary resources to solve some of Neza's most pressing issues.

Interviewee C-451, who was a high-level planning official in the state's government in 1972, explains the operation of those meetings. From his perspective, it is very clear that the involvement of every relevant government agency in those meetings was only possible due to the personal relations that a powerful individual like the state's governor had. Thus, the mobilisation of this kind of resources was only possible due to the collective actions of Neza's residents that led to the construction of relations of linking social capital with the individuals that possessed the resources needed to achieve Neza's collective goals.

...every Saturday, we came from Toluca, I lived in Toluca at the time, [C-352], [C-352's] driver and I, in a car, to Nezahualcóyotl to host town hall meetings. There, the people came to present their problems. I acted a bit like, in a strange

urbanistic role, as a kind of record keeper. I recorded the names of the people and the problems they had, and indeed, we tried to solve them with the different government bodies and organisms that were there. [C-352] had, extraordinary connections, he had great power, and because of it, he was able to bring all the organisms of the federal government that could have something to do with Nezahualcóyotl City. […] This was very valuable, because in a very short time we were able to do all sort of things. (C-451)

Even when the state's resources that were being mobilised in those meetings were already beyond the possibilities of bonding and bridging social networks of Neza, those resources were still insufficient. In the 1970s, the State of Mexico had a total public works budget of 5.3 million dollars, while the estimate cost of Neza's works was 15 million dollars (Benítez, 1999). This made governor Hank González seek further resources with national development banks, and the World Bank.

First, they started with the company ICA [Civil Engineers and Associates], and then it got through to Banobras42, due to his acquaintances in Banobras… and Banobras feeds itself from Nacional Financiera.43 And meanwhile, I do not lie to you, there were at least three missions of the World Bank, which was chaired by Robert McNamara… Those were called fact find missions. And to the third, they arrived to the conclusion that these people [Neza residents] would never pay, because they were poor among the poor. (C-352)

While governor Hank González was working in securing such funding, he convinced the largest construction company of the country to carry out the works in Neza as a credit, by promising them that he was going to be able to get sufficient funds to pay them back:

I recruited ICA, the country's biggest construction company. My argument was this: you have machinery, an extraordinary technical team and you do not have contracts. A new government does not come doing works. Works must be planned in advance and that takes a long time. Your machinery will be stopped, the technicians will go to work elsewhere, you will suffer huge losses. Now, since I have works and have no money, I propose a deal: you will do water and drainage works in Nezahualcóyotl for an initial value of 400 million [5 million dollars], in the meanwhile I will get the necessary credits. I am sure I will get them. (Hank González, cited in Benítez, 1999, pp. 245-246)

42 *Banobras* and *Nacional Financiera* are two state-owned development banks of the Mexican government. *Banobras* is dedicated to investing in public infrastructure projects, and *Nacional Financiera* is the body of the Mexican government in charge of the management of credits from abroad.

43 Idem

Credits were then negotiated under the premise that the State was going to be able to pay back relying on the council tax that Neza residents were going to start paying. Governor Hank González convinced Neza residents of the importance of paying taxes, by assuring to them that this time tax money would be reinvested in the community in form of the public works Neza had been pursuing. This way Neza's basic collective goals were finally starting to be met.

> *[Bankers thought that it was a crazy thing to do] [b]ut I used to tell them: "Consider that there are 156 000 lots in Nezahualcóyotl. Assuming 6 000 will not pay, 150 000 lots remain." 1 500 million divided by 150 000 lots means that each owner pays one thousand pesos annually for a decade, 80 pesos a month, so it is not madness but profitable financing " (Hank González, cited in Benítez, 1999, p. 247)*

At the same time, negotiations between Neza's community groups and the government continued in relation to the property of land. These negotiations culminated with the legal agreement of expropriating the land from the developers in 1973 (DOF, 1973). This way Neza residents could acquire their lots directly from the state. To do so, Neza's community groups negotiated the creation of a trust fund to manage the money of the lot selling process, and reinvest part of the money on the necessary works to meet Neza's basic collective goals. Participation in the trust's directive committee was also negotiated, and Neza residents got two positions out of fourteen (DOF, 1973), which allowed them to advance their agenda even further.

At this moment, according to some interviewees (A-718, and C-723) Neza's social network divided in two large sub-networks. However, no evidence of an actual division of the network was found in the analysis of the network, as is demonstrated in Chapter 6. Nevertheless, several interview sources confirm a division within network participants. This division was the result of a disagreement between those forwarding the idea of reaching an agreement for the expropriation of the lands from the developers, and those opposing it. Those opposing argued that this agreement would legalise the land fraud committed by the developers. This division meant that the group opposing the expropriation looked for help from an extra-community organisation: The General Union of Workers and Farmers of Mexico (UGOCEM). The UGOCEM is a left-wing workers' union at that time linked to the Mexican Communist Party, and as such, political opponents to the party in power. The mechanism used to link with UGOCEM were similar to the ones previously described: someone in the community knew someone in UGOCEM:

> *Then there was a colleague, from Guanajuato precisely, who told us that the UGOCEM could advise us. And so, we approached the leaders of the UGOCEM at the time. And they guided us. Indeed, they knew a lot, so we decided to join*

with them. Then we started the fight. The Council of the Restoration Movement44 agreed with the trust, and we continued to fight for the government to regularise us and give us documents. Not the developers. (A-718)

This relation of linking social capital also helped participants to obtain land titles, but it took longer (according to A-718, this only happened until the 1980s). However, while the achievements of this network were rather modest in terms of land tenure, UGOCEM remained in Neza, and forwarded Neza's first left-wing government in 1996. Neza remains under the government of left-wing parties since then.

In this period, Neza leaders started to participate politically in the municipality, which allowed them to occupy different government offices. This helped them to accountably represent the interests of the community, and was the result of the emergence of a new set of rules of reciprocity. Collective actions of Neza's networks would transform from demonstrations to votes, in exchange for positions in government to advance Neza's goals; thus, Neza's social capital transformed into political capital.

Well, in 1973 there was a [municipal] president here in Nezahualcóyotl that was called, is called... Oscar Loya Ramirez, he was from Sinaloa or something like that... He came to be president here. Then they gave a deputation and city council positions to some restorers. To calm them, so they would not continue the fight, I believe. They gave them a place. When they began their work as deputies and as city councillors […] it opened the door for us to reach the authorities and acquire the services. (A-725)

The story of Neza's linking social capital during the achievement of both strategic collective goals (municipal independence and land tenure), suggests that in both stances, the objective was to obtain accountable political representation. First, in the form of an independent municipality. When the municipal independence was achieved, but it did not represent the interests of Neza, but those of the developers; Neza's social network struggled to seize developers' source of power: the ownership of the land. By achieving secure land tenure, Neza's network was also able to forward and achieve its basic collective goals.

The process in which Neza's social network achieved its collective goals seems to be related to the transformation of the institutions of the state from extractive and undemocratic, to accountable and democratic. This transformation was achieved by challenging the sources of power of the actors that benefitted from maintaining extractive and undemocratic institutions. The role of linking social capital in this process was to open adequate channels of communication, and to establish new sets of rules of trust and reciprocity with actors in positions of power, able to modify the agendas to benefit of Neza's interests. It is

44 The Restoration Movement was the name of the social movement for the achievement of Neza's land tenure rights. The Council of the Restoration Movement was the steering committee of the movement. The name that Neza residents use to refer to members of the Restoration Movement is 'restorers'.

also relevant to note that, even when the role of politics in social capital is not recognised by Putnam (2000b), evidence from Neza's case-study suggests that politics are relevant when the necessary resources for the achievement of social networks' collective goals are controlled by the state; which is the case for development goals (i.e. beyond everyday basic goals). This resonates with the notion that social capital needs to be able to politically challenge groups with vested interests in maintaining business as usual Harriss (2002). Thus, Neza's social network engages in politically meaningful activities as a mechanism to build linking social capital for the achievement of their collective goals.

7.3 Concluding remarks on the social capital of Neza's social network

This chapter has elicited both dimensions of social capital (its structure, and its operation) for the case of Neza's social network in the context of the achievement of six collective goals (municipal independence, land tenure rights, water supply, drainage, public transport, and paved streets). Network structure was investigated through the methods of SNA, using data collected during archive mining (see Chapter 3). Network operation was researched qualitatively applying the procedure of thematic analysis to the interview data collected in the field (see Chapter 3). The analysis of both datasets in this chapter reveal that three types of social capital (bonding, bridging, and linking) were necessary to achieve Neza's collective goals. Furthermore, the use of the three types of social capital by the participants in the social network varied throughout the period investigated in this research (1953-1986). Variations in the types of social capital displayed by network participants define the interplay of moments of slow and rapid change observed in the longitudinal operation of Neza's social network.

Evidence from the analysis of the structure of the network reveals that the use of bonding, bridging, and linking social capital by Neza's social network was particularly relevant in moments of rapid change. This was measured in terms of the presence of large dominant bonding groups of Neza residents within the network, and the nature of the ties between network participants (homophily). The analysis showed that the emergence of large bonding groups of Neza residents (relative to the total size of the network) only occurred in moments of rapid change. At that time, the network reached its highest scores in homophily, meaning that the pursuit of strategic collective goals was supported by a large set of ties of bonding social capital among Neza residents. Furthermore, the existence of multiple bonding groups within the network linked to each other by few actors (nodes) at moments of rapid change shows that bridging social capital was also relevant in these periods. Finally, linking social capital was found primarily in moments of rapid change. As it was explained earlier in the chapter, bridging and linking social capital, from a structural perspective are rather similar, as both types of social capital tie groups that in the absence of linking or bridging actors would be disconnected to each other (cut-points). The difference between linking and bridging nodes performing as cut-points is assessed

qualitatively. If bridging actors are Neza residents connecting bonding groups of Neza residents, then the structure corresponds to bridging social capital. On the other hand, if bridging actors are government actors connecting bonding groups of Neza residents, then the structure is that of linking social capital. From the analysis of network data, it was found that linking social capital is also present the most in moments of rapid change. Furthermore, linking social capital performed by government actors is the type of social capital that ties the network together in moments of rapid change. That is, evidence suggests that the three types of social capital are the most active at moments of rapid change.

From the analysis of interview sources, a similar pattern was observed. That is, Neza's collective goals were supported by the simultaneous operation of bonding, bridging, and linking social capitals. Interview data offered evidence of the operation of social capital. First, bonding social capital was boosted among Neza residents by the construction of family-type links through the operation of culturally embedded figures such as compadrazgo. The establishment of compadre relations among neighbours enabled Neza residents to secure networks of reciprocity similar to the ones offered by family members. Bridging networks emerged in the municipality as bonding networks merged with each other. Bridging social capital emerged under the basis of reciprocal exchanges between bonding groups, and complementarity of skills and resources. That is, bonding groups engaging in bridging relations reciprocally supported collective actions of each other (i.e. participating in joint demonstrations). In addition to this, bridging relations also emerged from the complementarity of resources and skills that each group had. For instance, one group may have been large in number of participants, and other may have had access to relevant information, thus they might have joint efforts in exchange of the resources and skills of each other. Furthermore, the emergence of bridging social capital was used as political leverage to call for the attention of actors in positions of power with whom Neza residents were interested in building linking relations. Interview sources show that all types of social capital relations were deliberately created and strategically pursued by Neza residents to facilitate the achievement of increasingly complex collective goals. That is, bonding networks were expanded by the use of compadrazgos, to secure family-type exchanges (i.e. cooperation in house construction tasks); bridging networks were sought to facilitate linking social capital, and linking social capital was pursued to secure resources for the achievement of Neza's collective goals.

This chapter completes the answer to both research sub-questions: What network structure supports the operation of social capital for the resilience of self-help settlements; and How do networks of social capital operate for the resilience of self-help settlements? On the one hand, findings of this chapter suggest that achievement of Neza's collective goals was facilitated by relations of bonding, bridging, and linking social capitals. The different types social capital were not necessarily present throughout the longitudinal period observed; rather than that, findings show that different types of social capital are relevant at some moments, but not all. Thus, different configurations of the network struc-

ture were used by network participants for the achievement of Neza's collective goals. On the other hand, the operation of the network is revealed in this chapter, pointing to the instrumental use of culturally-embedded practices of network participants to build ties inside and outside the community. In the following chapter, findings from all the chapters of this thesis are discussed, providing answers to the research questions that guided this investigation.

8. Discussion and conclusions

This thesis has explored the role of social capital in the resilience of self-help urban settlements. Through a single-case study with embedded units of analysis, this thesis has unveiled the particularities of the structure and operation of networks of social capital in the context of the urban resilience of Neza, a self-help settlement in the Metropolitan area of Mexico City. In doing so, attention has been paid to understand the two main parts of social capital, structure and operation, in the context of urban resilience.

This thesis has aimed to understand the ways in which networks of social capital prompt responses to environmental threats, which in turn permit the continuous improvement of the wellbeing of network participants (Adger, Brown, et al., 2005), as part of the urban resilience framework. In this thesis it is argued that the improvement in the wellbeing of Neza residents was accomplished through the achievement of a set of six collectively defined goals: municipal independence, land tenure, drainage, water supply, paved streets, and public transport. The conceptual link between urban resilience and the collective goals used as embedded units of analysis of this case study, is that the achievement of these collective goals allowed Neza residents to cope with environmental stress and institutional uncertainty, which in turn improved Neza's living conditions over time. Understanding the role of social capital in the urban resilience of Neza requires a reflection across the three empirical chapters of this thesis, on the longitudinal network structure and the collective actions that Neza's social network forwarded to achieve six collective goals, as responses to a challenging environmental and institutional setting for the development of a self-help settlement. This chapter centres its attention on providing answers to the research questions that guided this research, and in presenting the concluding remarks of the thesis.

8.1 Discussion: The role of social capital in the resilience of self-help settlements

This section answers the research questions that guided this research. It is important to recall that the main research question of this thesis is: Why do networks of social capital contribute to the resilience of self-help settlements? This question has two subsidiary questions, focusing on the two dimensions of social capital (network structure, and operation). The first sub-question is: What network structure supports the operation of social capital for the resilience of self-help settlements? The second sub-question is: How do networks of social capital operate for the resilience of self-help settlements? Answers to both sub-questions support the claims to respond the overarching question of this research. The first part of this chapter addresses the findings on the structural characteristics that the Neza's network of social capital adopts to support its actions in the context of the pursuit of the collective goals that enhances resilience. The second part of the chap-

ter reflects on the operation of networks of social capital that allows the achievement of collectively defined objectives in the urban resilience milieu. The final part of the chapter utilises the arguments offered to answer the two sub-questions and provides an answer to the overarching research question.

What network structure supports the operation of social capital for the resilience of self-help settlements?

This section discusses findings of this thesis regarding the network structure that sustained Neza's collective action in the context of its urban resilience. It is important to recall that the main dimensions of social capital are social networks and their embedded norms of trust and reciprocity, the former being the most observable dimension of social capital (Lollo, 2012; Newton, 1997). Social networks emerge from the repeated interaction between members of society (DeFilippis, 2001; Rohe, 2004). For the purposes of this research, those repeated interactions were researched in the form of community documents related to the collective goals here investigated. As discussed in Chapter 2, the concept of social capital is relevant in the context of urban resilience, and furthermore some scholars suggest that the structure of social networks of social capital is relevant for facilitating collective action in the achievement of resilience (Tompkins & Adger, 2004). However, as noted by L. Newman and Dale (2005), the structural characteristics that allow social networks to enhance resilience remains unclear. In this section, findings on the network structure of social capital in the context of Neza's resilience are discussed.

The first finding of this thesis is the identification of a distinctive social network that operated in Neza in relation to the achievement of the collective goals studied in this research. Exploratory findings of this thesis proved that indeed a network of social capital is responsible of the achievement of the six collective goals investigated in this research (municipal independence, land tenure rights, water supply, drainage, public transport, and paved streets) in the context of Neza's urban resilience. Furthermore, despite six distinctive collective goals being investigated, findings suggest that the collective goals are linked to each other through the co-participation of some network actors in multiple collective goals, effectively linking a single social network of 706 actors. Findings also suggest that the composition of the network in terms of the characteristics of its actors is diverse. Participants engaged in that network from a variety of capacities: Neza resident 486 (67.7%), community organisation 51 (7.2%), government official 121 (17.1%), political organisation 3 (0.4%), developer 33 (4.7%), contractor 12 (1.7%), and public transport entrepreneur 13 (1.8%). Contrasting the particularities of the size, and composition of Neza's network of social capital with existing literature on resilience and social capital is difficult, given that social network characteristics are context-specific, as noted by Bodin and Crona (2009), and L. Newman and Dale (2005). However, in the case of Neza, the pursuit of collective goals to overcome the challenges of the setting required the integration of participants into a single network with a diversity of intra and extra com-

munity actors. The latter relates with observations made by Bodin et al. (2006); (2012); Granovetter (1983); and Sandström and Rova (2009), who suggest that the success of social networks in facilitating collective action relies on finding a balance between a diversity of actors, linked to each other through strong and weak ties. A theoretical addition to the latter from the findings of this research might be that the pursuit and achievement of multiple collective goals depend upon the complementarity of objectives being pursued. Complementarity might go beyond obvious similarities (i.e. water supply, and drainage), but in terms of how the achievement of one goal might facilitate the achievement of others (i.e. municipal independence to achieve water supply and drainage).

The second finding of this thesis with regard to the structure of Neza's network of social capital is the evolution of the network through time. It is important to recall that this research observed Neza's network of social capital longitudinally (1953-1986). During the period investigated, it was found that actors' engagement in Neza's network of social capital did not occur in a continuous fashion. Rather than that participation in network activities, measured in network size and number of events varied through time and periods of rapid change, and periods of slow change were found. Periods of rapid change are marked by the pursuit and achievement of specific collective goals (municipal independence: 1957-1963, land tenure: 1968-1974, and completion of street paving works: 1975-1981); while moments of slow change precede or succeed periods or rapid change (1953-1956, 1964-1967, and 1982-1986). That is, collective actions of Neza residents reached successive stable states after three distinctive modifications were introduced: municipal independence, secure land tenure rights, and paved streets. The interplay of moments of rapid and slow change in the activities of Neza's network of social capital resonate with the proposition of resilience theorists such as Folke (2006) who considers that in social-ecological systems, periods of gradual change interplay with periods of rapid change, while multiple stable states of the same system may be possible. Furthermore, in Neza, periods of rapid change follow a distinctive trajectory: formation, peak and acute reduction of network's size (number of active members) and activities. The latter supports the reflection made by Pelling and Manuel-Navarrete (2011) on the work of Handmer and Dovers (1996), suggesting that in resilience *"history proceeds through periods of institutional stability, challenge, crisis, and reorganization"* (Pelling & Manuel-Navarrete, 2011, p. 2). The latter in turn, as noted by Pelling and Manuel-Navarrete (2011), also echoes resilience theories emerging from ecology, such as the adaptive cycle proposed by Holling and Gunderson (2002): exploitation, conservation, creative destruction, and renewal.

The third finding on the structure of Neza's network of social capital is related to the longitudinal pursuit of collective goals. This thesis investigates six collective goals (municipal independence, land tenure rights, water supply, drainage, public transport, and paved streets) forwarded by Neza's network of social capital that served to overcome Neza's sources of vulnerability, and improve the wellbeing of its inhabitants over time.

Collective goals tend to disappear as they are met by the collective actions of the social network, while the network of social capital itself remain active (both, in periods of slow and rapid change). This feature of Neza's network of social capital contrasts with Coleman's (1988) theories of social capital, which suggest that the objective of social capital is productive, that is, making it possible to achieve certain ends that in its absence would not be possible. Coleman's view on the productive end of social capital seems to indicate that once an objective has been met, the reason for social actors to engage in social networks ceases to exist; which in turn may lead to their dissolution. Nevertheless, in the Neza case the emergence of new collective goals, and the disappearance of met ones without the dissolution of the network imply that the objective of the network is related to the sum of its pursued goals, rather than a single one. That is, the emergence of new collective goals in tandem with unmet ones could be related to the meaning of resilience as an ongoing process towards the continuous improvement of the living conditions of people (Gallopín, 2006).

In relation to the importance of collective goals measured in terms of network centrality, this thesis found a difference in the number of participants that the two types of collective goals (basic and strategic) gathered. Even when all collective goals were part of the same social network as they were linked to each other by the co-participation of some network participants, basic collective goals had a larger number of participants than strategic collective goals. This was the case even though it was recognised by the majority of interviewees that meeting strategic collective goals was instrumental in achieving basic ones (this is further discussed in the following subsection, dedicated to the operation of the network). The strategic use of collective goals reinforcing each other was also found through the qualitative analysis of network graphs investigated in this thesis. The relation between network participants and collective goals was analysed using two-mode graphs (actors to collective goals), displayed in a way in which the position of the nodes corresponded to their theoretical positions (i.e. proximity of nodes in the graph correspond to their proximity in activity). This represented the close relation of different collective goals, based on the co-participation of similar sets of network actors, which in turn indicates some complementarity between goals, or an instrumental use of one of them to facilitate the achievement of others. Thus, findings from the analysis of two-mode graphs show that while all the investigated collective goals are tied to each other by the co-participation of similar sets of network actors (implying that all goals reinforced the achievement of the rest), some goals share a larger number of co-participants, which is revealed by its proximity in the graph. For example, the collective goals of water supply and drainage were closely located in the graph due to a large co-participation of actors in both goals, demonstrating certain complementarity between goals; while other goals like secure land tenure rights seem to be far from the rest, despite its alleged importance for the achievement of other goals by interview sources. Furthermore, measuring the impor-

tance of the collective goals as passing points interconnecting other goals, (calculated in terms of two-mode betweenness centrality) helped discovering that strategic collective goals scored lower values than basic goals.

The fourth finding of the structure of Neza's social network is related to the crucial role that a small number of actors had in holding the network together in two distinctive ways: longitudinally, and by connecting multiple collective goals. First, the longitudinal operation of the network (1953-1986) was sustained by a small group of actors. That is, the transition between moments of slow and rapid change of network activities never implied the dissolution of the network. Rather than that, network connections seem to enter in a latency state in moments of slow change, and in active states in moments of rapid change. The active and latent states of the network are related with the interplay of forwarding (active state) and meeting (latent state) collective goals. Findings indicate that this was possible through the longitudinal engagement of a reduced number of actors that might have had the ability of making a strategic use of intra, and extra community connections to meet collective goals that spanned longitudinally. These actors might have had the ability of monitoring the achievement of collective goals, as trans-period conduits of information about past actions; and as keepers of the ties of social capital used to forward previous collective actions; effectively sustaining the network longitudinally. Second, a reduce number of actors was also able to understand that the achievement of Neza's collective goals depended on pursuing them in tandem, as the achievement of strategic collective goals was instrumental for meeting basic ones. Thus, few actors co-participated in the pursuit of several collective goals, and by doing so, they might have been able to coordinate actions with different parts of the network trying to achieve different goals, making it possible to achieve both types of collective goals. These findings may expand the idea of bracing social capital, as the strategic use of connections among a selected number of actors as a scaffolding for the achievement of a collective goal (Rydin & Holman, 2004) occurred longitudinally, linking together different moments. And between actors, and different collective goals. The longitudinal operation of few actors of bracing social capital, in the context of resilience, may contribute to explain how a reduced set of actors making a longitudinal strategic use of connections, also hold memory of past actions, which may help to reorganise in the emergence of new crisis (Berkes, 2007). Furthermore, the presence of a reduced number actors holding the memory of past actions, and making an strategic use of their connections may help explaining the observation made by Pelling (2011, p. 61), who suggests that *"social capital can remain latent in society, [as] social relations that might have been used in the past can be reinvigorated as new threats or needs arise"*.

The fifth finding on the network structure that supported the achievement of the six studied collective goals is the simultaneous presence of the three main types of social capital: bonding, bridging, and linking. Furthermore, the three types of social capital are structurally interconnected to each other by few actors, which implies that the operation

of the network is structurally explained by bracing social capital. That is, groups of bonding, bridging, and linking social capital are tied together by a sub-structure that resembles that of bracing social capital allows to understand the characteristics of the collective action of stakeholders in prompting appropriate responses to environmental threats in the Neza case. This finding supports the idea that the structural characteristics of networks of social capital is relevant for facilitating collective action (Grant, 2001), and that networks' structure thus play a significant role in achieving resilience (Tompkins & Adger, 2004). Furthermore, findings on the network structure that supported Neza's collective action echoes Adger (2003), who suggest that collective action in response to environmental threats is possible through the interaction of bonding, bridging and linking social capitals. As bonding and bridging groups acting as cohesive units frame the challenges faced; overcome inertia, and act collectively. And linking social capital, where the state acting in partnership with bonding, and bridging groups mobilise resources and enhance resilience. This finding also expands Adger's (2003) observation, by offering a structural explanation of the interaction of different structures of social capital through bracing social capital. Nevertheless, this finding does not necessarily contradict the argument of L. Newman and Dale (2005), who consider that the structural characteristics that allow social networks to enhance resilience remain unclear, as the particular structure that allowed Neza to overcome the sources of its vulnerability may be context specific, given that the structure, dynamics, and objectives of different social networks are unique (Bodin & Crona, 2009; L. Newman & Dale, 2005).

The sixth finding is that bonding social capital plays a crucial role in achieving collective goals, and may not hamper innovation as suggested in the literature. The analysis of the trajectory of the composition of Neza's network of social capital longitudinally demonstrated the crucial role of relations between similar actors. This is demonstrated by the tendency in the network for large blocks composed mainly by the same type of actors (i.e. Neza residents) to dominate the network. Moreover, this process in which a single group takes over the network is particularly notorious during periods of rapid change. This finding, when contrasted with metrics of the composition of ties between actors (homophily), results that in periods of rapid change ties in the network tend to occur predominantly among similar types of actors. The dominance of large blocks of similar actors (Neza residents), and the predominance of connections among them in moments of rapid change suggest that it is in these moments that bonding social capital becomes more important for the achievement of their collective goals, that is, for the transformation of the sources of their vulnerability. On the other hand, bonding social capital becomes less important for the network at moments of slow change (stability). These findings seem to contradict existing theoretical propositions on social capital that suggest that when a social network is dominated by bonding structures, its capabilities for effective collective action get reduced, due to the limited access to novel information as a result of having connections only with similar actors, which may hamper the ability of

the network to innovate (S. P. Borgatti et al., 1998; Everton, 2012; L. Newman & Dale, 2005). Nevertheless, this finding on the importance of bonding structures in moments of rapid change may find its explanation in the work of Handmer and Dovers (1996). They suggest that resilience requires transforming the status quo, however status quo is often maintained by agents of the state and the major interests of the capital who benefit from it, and as such transforming it requires large grass-root mobilisations. An explanation of bonding structures entering into latent states was found in this thesis in the high cost that maintaining bonding links in periods of slow change represent to network participants; thus, bonding groups only re-activate their participation in the network in crucial periods of rapid change. This interplay of moments of slow and rapid change with the observed fluctuations of the importance of bonding social capital also resonates with the proposition of Pelling and Manuel-Navarrete (2011), in their interpretation of the Holling's adaptive cycle previously discussed. In the Neza case, it may be that government actors were concerned in maintaining prevalent institutional conditions from which they benefited, while Neza residents organised in bonding structures challenged the status quo, forwarding subsequent institutional stable states, which were controlled by similar sets of actors and interests, which were then challenged again by bonding structures.

The final finding relates to the crucial role of government actors in performing bridging functions in the network (both as bridging and linking social capital). The study of the subnetworks of bridging actors resulting from subtracting them from the rest of the network shows that the network went from a structure in which bridging positions were performed by a mix of government actors and Neza residents, to one in which government actors predominately occupied those positions (in other words, from governance to government). This implies that, over time, hierarchy and control became relevant in the structure of the network. On the other hand, Neza residents' participation kept relevant at moments of rapid change, which implies that the longitudinal operation of the network relied on an interplay of government control and grassroots challenge. Sustained participation in the network was extremely costly for Neza residents, as it was too time-consuming to combine with a full-time job. Thus, one explanation for the increased role of government is that Neza residents pushed for the participation and accountability of government in collective action, in order to pass on the responsibility of achieving collective goals. However, when government control did not lead to further accountability, grassroots participation, measured in terms of the increased importance of bonding social capital (predominant blocks, and homophily among Neza residents) challenged the previous institutional stability. This finding also echoes the social interpretation made by Pelling and Manuel-Navarrete (2011) of the adaptive cycle proposed by Holling and Gunderson (2002) earlier discussed. This finding on the structure of the network may also find a theoretical interpretation in the work of Handmer and Dovers (1996), who consider that the state has an ambivalent role in transformative resilience. On the one hand, the state is concerned with maintaining the status quo from which it benefits, and on the oth-

er the role of the state is to override prevalent conditions in the interest of the common good. On the contrary, the role of the public is to create social pressure to force change to happen, for which maintaining connections with government actors is key. This also resonates with the work of Harriss (2002), who considers that social capital theory needs to recognise and explain how social pressure politically challenges vested interests. In the framework of resilience, this finding can be explained by the work of Adger (2003). Adger (2003) suggests that when the state is ineffective in addressing vulnerability issues, social capital substitutes local state management; and when partnership between the state and local groups of social capital exist, this facilitate resilience. Thus, the trajectory of Neza's subnetwork suggest that it went from an ineffective role of the state that required active citizens participation; to an improved partnership between citizen actors and the state.

In sum, the answer to the question of 'What social network structure support the collective actions in the context of Neza's urban resilience?' requires building on different arguments. First, Neza's resilience required the longitudinal engagement of a single network with the participation of a large number of Neza residents along with other extra-community participants, fundamentally government actors. Structurally, the network is integrated by the three different types of social capital (bonding, bridging, and linking). Actors engage around the pursuit of a set of collectively defined goals, which combined achievement contribute to the resilience of the settlement. Second, Neza's resilience required the longitudinal engagement of actors, since achieving a large set of collective goals suppose the incremental meeting of each of the goals, often one at the time. Achieving each of the goals required moments of massive engagement of network participants in order to create social pressure for the achievement of goals, and once goals were achieved the network entered into moments in which massive engagement was not required. Thus, the size of the network fluctuated as required for the achievement of collective goals. That is, the network had the ability of being flexible in entering into moments of latency, and moments of engagement. This required the longitudinal engagement of a reduced core group of network participants able to maintain latent ties with network participants to bring them back into activity as required. Thus, the network also had the ability of changing the importance of the different types of social capital of its composition, in particular of bonding social capital, which is the type of social capital that was required the most for creating social pressure at moments of massive engagement. This does not mean that bridging and linking ties were not relevant in the structure of the network, as structurally bridging ties (particularly linking connections) had an increasingly relevant role in harnessing the network together. Nevertheless, the network also had the ability of relying on different types of social capital as required for the maintenance of desired stable states (increased presence of linking ties), or the challenge of undesired status quo (greater activity of bonding structures). Thus, the network structure that support the col-

lective actions in the context of Neza's urban resilience is one that is flexible and able to act longitudinally in response of emerging challenges, and one in which the state plays a crucial – yet ambivalent – role.

How do networks of social capital operate for the resilience of self-help settlements?

This section discusses the characteristics of the operation Neza's network of social capital in the context of urban resilience. Social capital has two dimensions: structure, and operation (Lollo, 2012; Newton, 1997). In the previous section, the structural features of Neza's social network were discussed. Here, the characteristics of its operation are contrasted with existing academic literature. Chapters 4 and 5 found that early Neza residents faced a challenging setting where to settle. The area was prone to environmental hazards (e.g. dust storms, and flooding) that were exacerbated by the lack of basic urban infrastructures and services (e.g. water supply, drainage, paved roads, and public transport). Furthermore, challenges were aggravated by an irresponsive institutional framework (e.g. absence of an accountable government, and lack of land tenure rights). This challenging setting served as the context for the emergence of Neza's network of social capital, as early residents identified with each other as experiencing the same crisis, which in turn boosted solidarity between them. This process of mutual identification among social actors through the context in which they lived, is one of the explanatory possibilities that the concept of social capital, seen from the stand point of Bourdieu (2008 [1986]), has to offer for the understanding of how social classes form. According to Bourdieu (2008 [1986]), social classes emerge as a result of a common fait shared by societal groups, from which its members learn to identify and support each other's projects (DeFilippis, 2001; Portes, 1998). Furthermore, as Harriss (2002) sees it, social classes are reproduced by the construction of meanings through the shared connections of a particular group culturally and contextually united.

The formation of Neza's network of social capital, particularly at the local level (bonding and bridging social capital) was supported by the commonalities shared by its members. Although the population of Neza had a diverse ethnic origin, as nearly one third of the first settlers were rural migrants coming from different places of the country, the totality of the population shared a disadvantaged position in society, which led them to settle in an unsuitable area for urban development. The humble origin of early Neza residents in combination with the challenges of the context (environmental threats such as flooding, and institutional challenges such as irresponsive government) facilitated the co-identification of early residents for the formation of the network of social capital. In previous social capital studies, ethnicity is seen as producing strong ties at the interior of these groups, which facilitates coordination (J. S. Coleman, 1990), but hinders the expansion of ties beyond the group (bridging and linking social capitals). This in turn obstructs the coordination of the group for tackling complex tasks (R. S. Burt, 1992). Put-

nam (2007) in this regard considers that ethnic diversity may lead to a poor social capital performance. Miguel and Gugerty (2005) argue that ethnic diversity act as a deterrent for effective collective action. Nevertheless, evidence of this thesis contradicts these assumptions as the presence of people of diverse ethnic origin did not act as a deterrent in the formation of bridging or linking social capitals. Neza residents used a series of culturally embedded practices for the formation of ties of trust and reciprocity despite ethnic differences among early Neza residents. First, the institution of compadrazgo was used at the most local scale (neighbours) in order to expand kinship-type benefits from the household scale to the street and neighbourhood ones, despite possible ethnic differences. Second, the presence of ethnic-driven bonding groups was only observed in this research among the migrants from Oaxaca State. However, unlike other studies of social capital in which ethnic-driven bonding groups tend to exclude non-ethnic-members from its activities and benefits, ethnic-specific practices of Oaxacan groups facilitated the formation of bonding and bridging groups beyond ethnic-members. In particular the ethnic embedded practice of Tequio (a form of collective work) shared among Oaxacans was taught to other members of the community in order to engage others in collective actions for the improvement of the settlement, effectively incorporating non-Oaxacans to the actions and benefits of Oaxacan groups, which might have helped in the formation of bridging social capital. That is, the formation of Neza's network of social capital was facilitated by the interplay of at least two different informal institutions: bonding networks were expanded beyond ethnic and kinship boundaries by the compadrazgo institution; and bridging ties were facilitated using the ethnic-specific practise of Tequio.

The formation of Neza's network of social capital at moments of rapid change (periods in which intense collective actions, in terms of number of participants and events registered, forward and achieve specific collective goals) followed a distinctive trajectory in which three types of social capital are present. At moments of rapid change (those leading to the achievement of municipal independence and secure land tenure rights), small boding networks of neighbours operating at the micro scale (street level) started to coalesce into networks of bridging social capital. Then these larger networks of bridging social capital through creating social pressure (i.e. demonstrations) managed to access people in government to negotiate and forward Neza's collective goals. The formation of the social network at moments of rapid change suggests that the network expanded its reach from the most local scale, to the neighbourhood and municipal level, to state and national scopes through scaling-up the network of social capital: form bonding to bridging, and from bridging to linking social capital. This trajectory echoes what Grant (2001) observed in the strategies deployed by two poor communities in Guatemala City to negotiate their development. According to her, successful results depends on the use of a combination of bonding (so a community can act as a cohesive unit), bridging (to gain strength by linking with other community organisations with similar agendas) and

linking (to access more powerful groups) social capitals. Also, in the context of resilience, as earlier discussed is facilitated by the existence of bonding, bridging, and linking social capitals, as observed by Adger (2003).

The formation of Neza's network of social capital is expressed through two parallel affiliations, one citizen-lead, and the other politically oriented. That is, interview sources revealed that network participants were members of the PRI political party at the same time as being participating in citizen-lead organisations, making Neza's network of social capital politically and citizen oriented at the same time. Furthermore, findings prove that the formation of the PRI party followed a similar trajectory to that of citizen's one: street and neighbourhood scale PRI committees coalesced to form municipal scale ones, that linked to the state and national PRI party structures. That is, politically oriented affiliation followed a social capital-type of scale-up organisation of bonding, bridging, and linking social capital. Findings of this thesis suggest that the political affiliation of Neza residents, in parallel to their membership to citizen groups was used as a mechanism to build vertical extra-community ties, aiming to facilitate the mobilisation of resources for the achievement of community goals. This finding, on the one hand, contrasts with the idea that social capital is located in apolitical organisations (Putnam, 2000b). And on the other hand, supports the argument made by Szreter (2002) who calls for the recognition of politics in the framework of social capital. Finally, the political affiliation of Neza residents was instrumental in scaling up the reach of Neza's network of social capital in a political context in which, as demonstrated by Fox (1996) the state often oppose to the scaling of community organisations. Fox (1996) also argues that social capital scaling up operations are fundamental for the achievement of societal interests. Thus, parallel political affiliation of Neza's network members suggests that the network's operations were facilitated by being part of the political system.

Moreover, the emergence of networks of social capital in Neza seem to be driven by the specificities of the challenges that its participants collectively faced; this supports the idea that social capital emerges in context and history dependant ways (Edwards & Foley, 1997; Portes & Landolt, 2000). That is, the formation of Neza's network of social capital can be partially explained as the process in which Neza residents united due to the specificities of the challenges that their shared context presented to them and the collective process of socially understanding the crisis (environmental and institutional), which in turn fostered social learning among group members to support collective projects. The formation of Neza's network of social capital also relied on the ability of Neza residents to support each other's objectives. This was accomplished through the development of collective goals to face the challenges posed by the physical and institutional setting of their settlement. Chapters 4 and 5 of this thesis demonstrated a pattern in the way in which Neza residents referred to the challenges they faced when first arrived to the area. Interviewees talk about the challenges they faced from the solutions collectively pursued to the challenges faced by the community. For example, the absence of fresh water, sea-

sonal flooding, and dust storms are referred to by Neza residents from the collective need of achieving the construction of water supply and drainage infrastructures, and paved roads. Thus, the explanation of the formation of Neza's network of social capital resonates on the one hand with Siisiainen (2003), who suggests that the formation of social capital occurs through the collective engagement of actors in the pursuit of their common interests. On the other hand, findings from this research are in line with the observation made by Pelling and Manuel-Navarrete (2011), who consider that environmental crisis allow social groups to act collectively in the transformation of urban settlements towards resilience.

The two types of collective goals gathered the engagement of Neza residents in the formation of the network of social capital: basic and strategic. Basic collective goals focused on the achievement of the necessary infrastructures to overcome the environmental challenges of the setting. Basic collective goals were those of water supply, drainage, paved streets, and public transport. Strategic goals focused on the community objectives necessary to overcome the institutional challenges that hampered the achievement of basic collective goals. Neza's strategic collective goals were municipal independence, and secure land tenure rights. The development of different types of collective goals that support each other might find an explanation in the theoretical understanding of social capital as being productive offered by James S. Coleman (1988). According to James S. Coleman (1988), social capital is defined by its function, which is facilitating the achievement of certain goals of social structures, which in its absence would not be possible. Findings from this thesis suggest some sort of social capital accumulation in the development of mutually reinforcing collective goals. That is, expanding from James S. Coleman (1988), if social capital is defined by its function (the achievement of certain ends), then the accumulation of mutually reinforcing objectives may lead to larger stocks of social capital, which in turn might facilitate the accomplishment of objectives collectively defined. Furthermore, the mutual reinforcement of collective goals in Neza was also observed in the way in which interviewees referred to the set of collective goals that forwarded the formation of Neza's network of social capital (see Chapters 4 and 5); interviewees rarely referred to individual collective goals, instead, interviewees mentioned collective goals in tandem. That is, the shared agenda that gathered the participation of Neza residents into a network of social capital was the sum of six collective goals. Neza's collective action, while occurring around the six different collective goals framed by its participants as direct responses to the challenging conditions of the setting, did not suppose the formation of six independent networks. Thus, the objective of the formation of the network was productive, and it was seen as an instrument to forward Neza's residents shared agenda. This is in line with the observations offered by De Souza Briggs (1997), who suggest that the objective of the formation of groups of social capital is productive.

Although antagonism was present in Neza, it did not completely prevent co-operation between different groups. Finding complementary goals appears to be more crucial than getting on well in producing bridging capital, this is particularly relevant in the construction of bridging social capital observed between Neza residents, and the people of Chimalhuacán. Scaling-up Neza's network of social capital entailed the construction of ties with extra-community actors, in the form of bridging, and linking ties. Relevant extra-community ties of bridging social capital were built with the community of Chimalhuacán, a neighbouring municipality from which Neza emancipated, and with whom Neza residents had a historical antagonism, since Chimalhuacán inhabitants believed Neza residents had stolen their lands (described in Chapter 4.2). Building ties of bridging social capital between Neza's network of social capital, and Chimalhuacán inhabitants was crucial for the advancement of Neza's collective goals particularly that of achieving secure land tenure rights which was being challenged by the actions of Chimalhuacán inhabitants, and the procedures of extractive institutional practises. Thus, building ties between Chimalhuacán and Neza residents, was actively sought by Neza network participants. This was achieved through the negotiation of few members of the Neza's network with leaders of Chimalhuacán, resulting in mutually beneficial agreements that eventually allowed Chimalhuacán residents to get a rightful payment for their lands, and Neza network participants to achieve the collective goal of secure land tenure rights. That is, ties between both communities were built under the basis of negotiated reciprocity: Chimalhuacán inhabitants helped Neza residents to achieve secure land tenure rights in exchange to Neza's resident's collaboration in securing a rightful payment over Chimalhuacán lands. Building ties of bridging social capital at the interior of Neza also occurred on the basis of reciprocal complementarity of resources between groups. Findings suggest that bonding groups coalesced into groups of bridging social capital when groups found that by extending ties between groups, members could access mutual resources, for example some groups provided knowledge in exchange of mass group participation in the other group's activities. The formation of groups of social capital has long been explained through the emergence of trust among groups that yield in mutual reciprocity that enable them to act collectively, for which findings of this thesis corroborate previous studies on the subject (Bourdieu, 1989; Coleman, 1988; Putnam, 2000). However, the construction of bridging ties through negotiation between otherwise antagonist groups may provide some clues for the use of social capital in the development agenda, by helping groups finding areas of complementarity to build trust and reciprocity.

The formation of linking ties was facilitated by the action of key individuals in the community who had extra-community acquaintances in positions of power and influence; able to mobilise resources for the achievement of Neza's collective goals. That is, in the formation of the social network, Neza residents understood that they needed extra-community ties to allow them to achieve their collective goals. Thus, Neza residents actively worked in the construction of such ties. Examples include the use of demonstrations, and

the dual affiliation of network members to citizen's, and political parallel structures. The other mechanism used by Neza residents to build linking social capital ties in the formation of the network was the individual social capital of one of Neza residents, who was acquaintance of one of the most influential figures in Mexican history. Thus, the exploitation of a single man's contacts allowed the entire community to build ties way beyond their collective possibilities. The use of individual acquaintances has been previously studied in social capital, particularly by Ronald S Burt (2002) to explain how individuals make use of missing links to access and mobilise resources beyond existing links. This individual use of ties resonates with Coleman's (1988) interpretation of social capital as being property of individuals. However, in the Neza case, individual contacts were used for the wider benefit of the community, which resembles Putnam's (2000b) understanding of social capital as a collective good. Furthermore, this finding, in the context of urban resilience suggests that even when a combination of bonding, bridging, and linking social capitals are needed for the collective facing of environmental threats, as suggested by Adger, Brown, et al. (2005), the ability of social networks to build ties of all types of social capital may reside in the capacity of some individuals to exploit weak links to scale-up the network.

Scaling-up the network in the difficult institutional context in which Neza's social network operated supposed to face the obstruction of network activities by the coalition of government, and elite actors (the developers) whose interests were being challenged by the activities of Neza's network of social capital. As network activities were repressed by the mobilisation of the police by government actors, Neza's network of social capital relied on the strategy of building extra-community ties, through the political affiliation of network participants in the government's party, and the parallel strategy of creating alliances with powerful political figures able to out-power government actors mobilising police repression. This finding contradicts Putnam (2000b) notion of social capital as being located merely in apolitical organisations, and rather supports Szreter's (2002) argument that political and status-quo-challenging organisations play a role in social capital. Furthermore, this finding is in line with the observations made by Fox (1996) with regard to the difficult scale-up process of social capital in the authoritarian Mexican context. Fox notes that in the Mexican context, government and elite actors often violently obstruct the scaling-up of social capital, limiting its action within the most local scale, thus impeding social capital possibilities for challenging the status quo, which in turn is often the source of underdevelopment of Mexican communities. Fox also observes that in the Mexican case, the role of some elites in allowing or promoting the scaling-up of social capital allows the achievement of societal transformations (Fox, 1996); this is the role played by some prominent political figures in Neza, which allowed the scaling-up of Neza's network of social capital, and in turn facilitated the achievement of Neza's collective goals.

Beyond the formation of Neza's network of social capital, composed by ties of bonding, bridging, and linking social capitals, each of these were operationalised by network participants in different ways for the achievement of Neza's collective goals. First, bonding social capital served to address most immediate challenges, which was allowed by the use of compadrazgo institutions, which extended family-type ties with neighbours expecting the kind of solidarity that family members provide. In the Neza case this meant securing help, such as financial aid, and labour help for the reconstruction after the effects of environmental threats. Bonding social capital also served for the socialisation and understanding of the common challenges that Neza residents had to face, which in turn boosted collaboration between residents, as they rapidly realised that solving the challenges they were facing required extending collaboration ties with the rest of the community. Bridging social capital served for the socialisation and understanding of the common threats faced in Neza beyond bonding groups, and beyond Neza itself (the case of Chimalhuacán inhabitants). Bridging social capital served to frame the collective goals of the community (or both communities at the moment of the pursuit of secure land tenure rights), and build sufficient social pressure to seek aid beyond the community, in the form of linking ties with people in positions of power (mainly government actors). Linking ties built through social pressure, political engagement of network actors, and the mobilisation of weak ties allowed the mobilisation of the necessary resources from the exterior for the achievement of Neza's set of collective goals. The simultaneous operation of different types of social capital has been regarded as highly relevant for the achievement of collective goals (Adger, Brown, et al., 2005; De Souza Briggs, 1997; Grant, 2001; Kusakabe, 2012; Rydin & Falleth, 2006; Rydin & Holman, 2004; Szreter, 2002).

In sum, there is no single answer to the question *"How do networks of social capital operate in the context of urban resilience?"*. First, the initial challenging conditions of Neza's setting served as a common context for the mutual recognition of Neza residents as a distinctive group that needed to act collectively in supporting each other projects to overcome shared challenges. Second, the development of collectively defined goals as responses to the challenges faced by Neza residents gathered participants from the community in pursuit of their common interests. Third, the presence of culturally embedded practices such as compadrazgo, and Tequio helped a culturally diverse population to overcome its differences and coalesce into networks of bonding and bridging social capital in the pursuit of their common interests. Clientelism, a practice that is commonly associated with malfunctioning political contexts, in the case of Neza, allowed residents to link with government actors through the transformation of social capital into political capital, which in turn was productive in the achievement of Neza's collective goals. Fourth, the formation of Neza's network of social capital is also explained by its scaling-up, integrating bonding, bridging, and linking social capital to different parts of the network. Fifth, bridging social capital (building ties of trust and reciprocity between different groups) meant that such groups could share and make use of their complementa-

ry resources. Sixth, linking social capital is explained by the social pressure of collective actions such as demonstrations, the political affiliation of network participants, and the use of weak ties made by key individual network participants for the public benefit. But overall, it is through the simultaneous building of ties of trust and reciprocity of bonding, bridging, and linking that Neza's network of social capital operated in the context of urban resilience.

Why do networks of social capital contribute to the urban resilience of self-help settlements?

Running through this thesis is the idea that social groups operating in self-help settlements can forward their resilience by the productive use of their relations of trust and reciprocity. This explanation is at the core of social capital theory. Thus, social capital is used as an explanatory tool to unveil the societal operations that support the resilience of self-help settlements. Here, a reflection on the contribution of networks of social capital to resilience of the self-help settlement is provided, thus answering the thesis' overarching research question.

In order to answer the overarching research question, it is necessary to bring back the definition of urban resilience that guided this research. Urban resilience is defined in this thesis as the processes allowing the continued adjustment of cities in an evolutionary fashion through their history (Adger, 2000; Pickett et al., 2004) in the face of environmental uncertainties and nonlinearities (Leichenko, 2011). For this, cities depend on many abilities (i.e. flexibility, adaptability, and transformability), expressed in various dimensions (social, and spatial). The outcome of resilience's historical process allows urban populations to increase their standards of living and develop in an inclusive fashion (Adger, 2000; Leichenko, 2011; Pickett et al., 2004). In this section, findings from the case of Neza are contrasted to this definition of resilience. First, evidence from the case-study is explored as a longitudinal process. Second, a reflection is offered on the abilities of flexibility, adaptability, and transformability forwarded by Neza's network of social capital. Third, the interrelation between both dimensions of urban resilience (social, and spatial) is discussed. Finally, a reflection is provided on the answer to the overarching question of this research.

This thesis has explored Neza's resilience as a longitudinal process, in which the continuous engagement of social actors (intra and extra community actors) organised into a network of social capital is key for the achievement of the collective goals of Neza residents in the face of environmental and institutional challenges. Thus, this longitudinal process results from the longitudinal operation of networks of social capital that allow the continuous monitoring and understanding of the challenges faced by the self-help settlement through its history. This permit networks of social capital to develop and pursue appropriate responses to those challenges in the form of collective goals through the collective action of its members. Thus, allowing the continued adjustment of the settlement

in an evolutionary fashion in face of environmental uncertainty and nonlinearities. This finding can be explained by the operation of bonding social capital in interpreting challenges at the micro scale (i.e. street level), bridging social capital in communicating challenges and creating support at the meso-level (i.e. community), and linking social capital in creating vertical partnerships with people at the macro-level (i.e. state, and national) in positions of power to mobilise resources for the achievement of community goals. The latter has been explained by other authors as the path followed in the achievement of collective goals (Grant, 2001; Kusakabe, 2012; Rydin & Falleth, 2006), and in the context of resilience: Adger, Brown, et al. (2005) suggest that resilience is achieved through the simultaneous operation of bonding, bridging and linking social capital. Findings of this thesis expand previous studies on the achievement of collective goals, including environmental and resilience related (Adger, Brown, et al., 2005; Grant, 2001; Kusakabe, 2012; Rydin & Falleth, 2006), by incorporating a longitudinal perspective on monitoring challenges, developing collective goals, and pursuing its achievement, for which the operation of different types of social capital is required. This finding thus provides some explanatory possibilities to the gap in knowledge identified by Pickett et al. (2004). They consider that it is still necessary to increase the understanding about how social groups perceive environmental change, learn from it, and develop actions to manage change in a positive and desirable fashion for the resilience of social-ecological systems. This process, as demonstrated by this thesis, can be explained by the longitudinal actions of actors participating in networks of different types of social capital.

The longitudinal operation of networks of social capital may be explained by the ability of the participants of the network to incorporate different types of social capital through history, depending on the requirements of the moment. This is reflected in the observed variation in size of Neza' network of social capital according to the relation of achievement, and pursuit of collective goals. In this process, different substructures of types of social capital within the network become more or less important (e.g. large substructures of bonding social capital are more relevant in the pursuit of collective goals). Moreover, changes in size, and importance of different types of social capital within the network does not imply that the network is disbanded, and forms over and over again. Rather, members of the network either enter in stages of active engagement, or in periods of latent engagement, without losing ties to the network. The operation of this process is supported by the ability of actors in maintaining latent ties to the network, which are activated as needed by few network participants engaged longitudinally. Activating different types of social capital within the social network, and thus expanding or reducing its size, implies that network participants need to be able to scale-up the reach of ties of trust and reciprocity according to the objective being pursued, and that network participants are aware of the need of keeping latent ties. This operation implies that ties of trust and reciprocity are maintained longitudinally. As Neza's network of social capital is built on the basis of culturally embedded practices of its members, perhaps culture facilitates

the longitudinal maintenance of ties, as bonding relations built through practices of kinship-type of trust and solidarity (i.e. compadrazgo) may provide long lasting bonding ties. Bridging networks are also enabled by culturally embedded norms, held by some members of bonding structures and transmitted to the rest when larger collective actions are required (i.e. Tequio). Ties of linking social capital might also be supported by institutional practises (i.e. clientelism), which create partnerships between participants of bridging networks and people in positions of power, by facilitating the exchange of reciprocal benefits, on the one hand the achievement of community collective goals, and on the other access and maintenance of government positions. This provides empirical evidence supporting the claim made by Pelling (2011) about the longitudinal use of social capital in resilience. According to him, social capital might remain in a dormant state, holding knowledge and experience from the past to be used when new challenges arise. The use of culturally embedded practices that cement trust and reciprocity among actors of social capital longitudinally might provide a local explanation on how social capital is stored, while maintaining its productive purposes for the achievement of collective goals. That is, as DeFilippis (2001) argues, social capital consists in some aspects of social structures that facilitate certain productive actions. Thus, findings of this research indicate that the aspects of Neza's network of social capital that facilitated the achievement of collective goals were indeed compadrazgo, Tequio, and clientelism.

Evidence of the change in the size of networks of social capital, in terms of number of participants, and the relevance of different types of social capital within networks' structure, reveal that in order to be productive, social networks need to scale-up their reach. Scaling-up means the possibility of reaching resources from beyond the locality where the network operates. The notion of social capital to scale-up in order to be productive in the development of poor communities has been acknowledge by Fox (1996). However, Fox notes that the scaling-up of social capital may be blocked if government and economic elites see that their interests are being challenged. Thus, network participants need to make use of their knowledge of cultural and institutional practices of network participants so they can overcome possible threats to the scaling-up of the network. This thesis shows that clientelism was used to overcome threats to the scaling-up of Neza's network of social capital. This explanation requires moving away from the understanding of Putnam (2000b) of social capital as apolitical, and acknowledging that the political mobilisation of poor communities expand their access to other forms of capital, making possible the achievement of poor communities' goals, as explained by Light (2004).

Regarding the abilities of flexibility, adaptability, and transformability required in urban resilience, this thesis found these in the operation and structure of Neza's network of social capital, as well as in the outcomes of the collective actions of the network of social capital. Flexibility is understood as the ability of systems to perform essential tasks in multiple conditions by introducing new approaches if current methods fail (Tyler & Moench, 2012), and as such allowing change to happen. Adaptability is the collective

ability to change that permits the continued adjustment of cities (Adger, 2000; Pickett et al., 2004; Wilkinson, 2012). Transformability is the capacity of people to create a new social-ecological system when the compound events from the conjuncture of multiple factors (economic, political, and ecological) make a system untenable (Folke, 2006; Pelling, 2011).

Flexibility is reflected in two features of the operation of Neza's network of social capital: in the mechanisms used for the construction of ties of linking social capital, and in the development of collective goals. Both features were fundamental in allowing Neza's network of social capital to perform its essential task: being productive in the achievement of the collective goals of the actors participating in it. Both features were developed by actors participating in the network of social capital as mechanisms to overcome failure in the achievement of their goals. In the case of the development of ties of linking social capital, which were essential for the achievement of collective goals, a flexible behaviour is observed in the myriad of strategies used by network participants for the development of such ties. Strategies deployed included the use of formal channels of communication (i.e. community petitions) to reach government actors, the use of weak links of Neza residents who are acquaintances of people in positions of power, the use of political and civic affiliations of network actors to reach people in positions of power, and the use of social pressure in the form of demonstrations to force access to government actors. In the case of the development of collective goals, a flexible behaviour is noted in the use of two types of collective goals. The first type of collective goals (i.e. basic collective goals) focuses on solving the physical challenges posed by the setting through the building of infrastructures; yet, this often failed and required a second type of collective goals for its achievement. The second type (i.e. strategic collective goals) tackles institutional challenges that hamper the development of self-help settlements; its objective is the achievement of the basic goals. Thus, the development of strategic collective goals shows flexibility in the operation of the network by introducing new approaches to perform the essential task of achieving basic collective goals. These findings support existing claims within the resilience framework, that suggest that in order to achieve resilience, social-ecological systems must act according to changing circumstances, that is to change rather than keep doing the same things (Shaw, 2012), by introducing innovative alternatives to cope with uncertainty (Haider et al., 2012). Indeed, this thesis provides evidence to support such claims, as in the Neza case, the ability of the network to be flexible allowed its participants to achieve their collective goals through the use of innovative approaches, and to forward change in the form of adaptations and transformations.

Adaptability and transformability were found in this thesis as outcomes of the flexible operation of the social network. Furthermore, adaptability and transformability seem to be interrelated, as transformations seem to allow the achievement of increased adaptability. In Neza, the achievement of the basic goal of building infrastructure was, as conceptualised by Folke (2006), a mechanism used by the population to adapt to its

ecosystem in an informed manner. In the case of Neza, this adaptation led to the improvement of the standards of living of Neza residents. This is consistent with the objective of adaptation according to the resilience framework, as explained by Gallopín (2006), which objective is the increased wellbeing of humans.

Transformability on the other hand prevents repeating the failure of previous adaptation rounds. This can be observed from a historical perspective, if rural-urban migration is seen as an adaptation of early settlers, seeking for the improvement of their wellbeing (adaptability as described by Gallopín (2006)). The transition between adaptation, and transformation has been acknowledged as part of the resilience framework by Pelling (2011); and Pelling and Manuel-Navarrete (2011), who suggest that the adaptive cycle of social-ecological systems goes from the development of adaptations to face immediate challenges, and when these adaptations fail or its capacity is exceeded, transformations occur in the development of new governance systems. Both transformations observed in this thesis were introduced to overcome the untenable system that early Neza residents had to face, which was the result of the combination of the environmental challenges of the setting, and the actions of an irresponsive government. This echoes the understandings of Folke (2006); and Pelling (2011) on the factors that explain the transformation of a social-ecological system, which result is an improved governance system. Nevertheless, in the case of Neza, it is possible to see that the two transformation rounds that were implemented (i.e. municipal independence, and secure land tenure rights), were used to hold the government accountable of forwarding physical adaptations (i.e. urban infrastructures). Thus, the role of networks of social capital in the transition between adaptation, and transformation is to understand not only the challenges posed by the environment, but also to acknowledge those difficulties that the institutional framework poses to the resilience of the settlement; and to act accordingly in the development of collective goals for the adaptation, or the transformation of the system.

The resilience framework assumes a relation of interdependence between the social and the spatial dimensions of urban settlements. In previous lines, such relation has been touched upon. First, the spatial dimension (environment), when interacting with the social dimension creates challenges to the wellbeing of humans. Actions of the government (social dimension) to mediate environmental challenges can either reduce, or magnify the challenges experienced by the residents of an area (social dimension). The organisation of the residents of that area can forward changes to the environment (physical interventions such as infrastructures), and the structure of the social dimension (e.g. improved governance), in order to forward improvements to the social-ecological system. Changes can either reduce or magnify the challenges experienced by residents of the area. These observations are in line with the work of others on the resilience of social-ecological systems, whom consider that there is an integral relation between the social and the spatial dimensions of resilience, that produces multiple feedbacks between them (Ahern, 2011; Dodman et al., 2009). This thesis suggests that feedbacks from the environment, in

the form of challenges to the inhabitants of self-help settlements, can forward their collective recognition as being suffering the consequences of the same challenges, and boost cooperation in the achievement of common objectives, which is part of the framework of social capital as understood by Bourdieu (1986). Then, the productive use of cooperative relations between individuals organised in social networks (social capital as framed by (J. S. Coleman, 1990)), forwards the achievement of collective goals to produce changes to the spatial (infrastructures), and social (improved governance) dimensions of resilience. If modifications produce further challenges, this cycle may repeat. Thus, the role of participants of networks of social capital is, as previously stated, to monitor challenges, develop responses to them in the form of collective goals, and create collective actions for their achievement.

Finally, networks of social capital contribute to the urban resilience of self-help settlements, because its participants monitor longitudinally the threats affecting self-help settlements, develop and forward solutions to those threats in the form of physical adaptations or institutional transformations; which in turn increases the wellbeing of their inhabitants. This is made possible by the social norms of trust and reciprocity that tie self-help settlement dwellers together, and allow them to develop collective actions to tackle threats (environmental or institutional). Residents of self-help settlements build ties of trust and reciprocity at the interior of the settlement, and beyond, according to the challenges faced, and the goals required to overcome them. These ties are maintained longitudinally, but they are only used as needed in face of changing circumstances (the emergence of new threats, and the collective actions required to cope with them). Thus, the contribution of networks of social capital to the urban resilience of self-help settlements is the longitudinal productive use of ties of trust and reciprocity in forwarding pertinent adjustments to the physical and social (institutional) dimensions of the settlement, effectively improving the quality of life of their residents.

8.2 Conclusions

The past four chapters of this thesis documented the role of networks of social capital in the context of the resilience of Neza, a self-help settlement in the metropolitan area of Mexico City. This final section provides a concluding reflection on: the key concepts that were used throughout this thesis, the research methods applied, planning practice implications, and avenues for future research.

Challenges and opportunities in the use of urban resilience and social capital concepts

The original interest for conducting this research was a planning practice concern. The interest was to understand how planning practitioners could provide solutions to the threats of climate change; particularly in areas of the Global South that are expected to

suffer the most from its dangerous effects: self-help settlements. To conduct the research, two concepts with a rife presence in the planning toolkit were selected: resilience, as the antidote to climate change; and social capital, an essential ingredient for urban development. In this section, a reflection about the use of both concepts in this research is offered.

At an early stage of this research, it was thought that the concepts of urban resilience and social capital were going to be used in parallel as explanatory tools for the case-study. However, soon enough it was found that while urban resilience is useful as guiding metaphor; the concept of social capital offers explanatory possibilities. That is, regardless what definition of resilience was used (i.e. ecological or engineering), resilience (as a concept that has recently been incorporated in planning studies from ecology and ecosystem studies), requires further development in terms of its implications in planning studies. Of course, this has been said by scholars working in planning theory, such as Davoudi (2012). Similarly to Davoudi's (2012) discussion on the use of resilience (evolutionary resilience in her case), a conclusion of this thesis is that using the principles of urban resilience to guide the study of social-ecological interdependencies might provide fruitful results. Results may unveil previously obscured elements, such as the strategies used by urban dwellers to cope with environmental threats, including politics, and culturally embedded practises.

The conceptual decision of using a definition of urban resilience emerging from an ecological perspective was made believing ecological resilience was more appropriate in urban planning. This is it because as discussed in the literature review, ecological resilience was perceived as critical to the roots of environmental threats (i.e. economic models), and had a clear normative agenda towards the improvement of the wellbeing of humans, acknowledging a relation of social-ecological interdependence. In contrast, engineering resilience was perceived as uncritical, while emphasising actions that lead to the maintenance of failed social-ecological relations. However, after finishing this thesis, it is considered that being conceptually locked-in with any of both of the understandings of resilience might have negative implications in planning practice. That is, if only engineering solutions are considered, this indeed might obscure the roots of vulnerability, which in the long run could provoke dangerous failure of cities. On the contrary, focusing only on ecological understandings could lead us to stop building relevant infrastructures which absence may also produce the failure of cities. Thus, based on the results of this thesis, it can be concluded that a better perspective, at least in planning, would incorporate the critical use of engineering responses within an ecological perspective. That is, combining the notion of long-term social-ecological perspective, without ignoring short term responses.

The use of social capital theories in this context might clarify the relations that urban dwellers deploy as part of their interaction with ecological factors. However, as proved in this research, it might be necessary to expand what social capital means beyond

traditional understandings. This does not only mean to move beyond Putnam's interpretations, or the World Bank's recommendations. It implies recognising that social capital might have different configurations, and a myriad of culturally specific expressions that make social relations productive, as initially proposed by James S. Coleman (1988). That is, a meaningful use of social capital theories should look for local practices that might cement trust and reciprocity, which outcome is the achievement of local collective goals. This might include the acknowledgement of practices that could bridge ideological preconceptions. For example, the recognition of clientelist relations in this thesis was key to understand how social capital becomes productive in the benefit of disadvantaged communities. Acknowledging the role of such relations in the framework of social capital does not imply its legitimation as socially desirable, but to recognise that such political particularities may provide alternatives for disadvantaged communities in contexts of weak formal institutions of political dialogue.

Another concluding remark of this thesis is that this investigation benefited from the longitudinal observation of social capital in the context of the resilience of Neza. Most studies focus their attention on taking snapshots of the role of social capital at specific moments. For example, in the context of urban resilience in disaster risk management studies, the role of social capital has been stressed as part of the self-organisation capacities of societies after a crisis (Daniel P. Aldrich & Meyer, 2015; López-Marrero & Tschakert, 2011). However, these studies fail to recognise that social capital has a role before, and after a crisis occur, and that those social relations might have a consequence in the ways in which a crisis is managed. Thus, looking at social capital longitudinally might provide relevant insights in resilience. Furthermore, widening the meaning of resilience to see it as a historical process (rather than an outcome), as it was done in this research, can also yield with further insights of how environmental change is managed by urban populations, and its effects in adjusting cities.

At the beginning of the investigation it was hypothesised that the resilience of self-help settlements was closely related to its development. And that a consequence of this, the type of social capital that this thesis should focus on was linking social capital, due to its theorised role in development (Woolcock, 1998). However, a lesson learned in the aftermath of this research, is that focusing on a single type of social capital might obscure the understanding of the role of social capital in achieving collective goals, including that of development. This does not mean that linking social capital is not of great importance in development, what it means is that the operation of linking social capital rests on the existence of bonding and bridging groups. Thus, the understanding of linking social capital is intimately related to the simultaneous observation of bonding and bridging social capital. Moreover, the longitudinal study of social capital conducted in this research proves that different types of social capital are more relevant than others at

different moments, according to the collective goal being pursued. That is, this showed that social capital is a dynamic process that can be better understood by conducting longitudinal research while considering the operation of multiple types of social capital.

In sum, translating resilience into planning practice is a long and arduous process. However, the study of the social dimension of resilience through social capital is useful in this regard. In so doing, the longitudinal study of different types of social capital in the context of urban resilience should provide important insights.

Reflections on research methods

After concluding this thesis, it is considered that the methods used provided rich, and detailed data to address the topic of the research. This thesis used two methods, quantitative (SNA), and qualitative (thematic analysis), which use sheds light on the two dimensions of social capital (structure, and operation) of participants in the resilience of Neza. This section looks back on the methods used, points to some lessons learned in the use of methods, and reflects on research design decisions that could have been taken differently.

The first lesson learned is that using a mixed-method approach is a challenging endeavour. Understanding the caveats and areas of complementarity between both methods, collecting data on the field, and analysing it was time- and resource-consuming. Fieldwork was initially planned to last six months. In practice, collecting enough data to feed two methods in a robust manner took eight months. All the time and resources invested in carrying a mixed-method research for a doctoral investigation, while providing rich material, implied that less time and resources were available at the end of the research, at writing-up stages. After finishing this thesis, it is now considered that all the decisions made in the research design have consequences both in the quality of the research, and in its feasibility. In terms of the quality of the research, the results achieved with the mixed-method approach would have not been possible if a single method was used. This is because the longitudinal nature of the topic made it very difficult to access relevant interviewees without having first an idea of the actors who participated in the process (collected through archive mining). On the other hand, the operation of the network would have been very difficult to grasp had interview data not been collected. Thus, the quality of this research benefited from the use of both methods. Regarding the feasibility of the research, the amount of time required to undertake the tasks for each method, significantly constrained the time left for finishing the research. Even when this research was finished on time, and its feasibility was never compromised, considering these factors is an important lesson for future research.

The second lesson relates to the type of research. Being a historical research, accessing relevant data was indeed a challenge. In this regard, this investigation relied on archival information to understand the structure of the engagement of participants

of Neza's network of social capital. Relying on archival information, and processing it using SNA was indeed helpful, however this method only allowed the identification of parts of the network that were recorded through institutional channels, and preserved in official records. It is possible that parts of the network were not recorded and preserved in official archives. In this research, an attempt was made to recognise actors beyond official records through the comparison of the list of participants recorded in archives, and those recognised by interview participants. However, this procedure proved to produce incompatible information for SNA, as interview participants did not provide information about the specificities of the ties of actors that were not recorded in archives, to those present in documents preserved in public records. Despite this pitfall of the method, network participants that were not present in archive documents, when interviewed, produced rich qualitative outcomes beyond the structure of the network.

After completing this research, it is considered that although some decisions made in the design of the research could have been different, the outcome of the investigation is a rich perspective on the contribution of networks of social capital to the resilience of self-help settlements. The richness of findings directly relates to the use of a mixed-method approach. And furthermore, the specific use of SNA and thematic analysis provided high quality data that might have been difficult to collect and analyse otherwise within the time and resource constrains that conducting a doctoral research implies. Nevertheless, the issues here addressed will positively impact the future research conducted by the author of this thesis.

Planning practice implications

As explained before, the main concern for endeavour in this research is a planning practice one: to understand how self-help settlements can become resilient to the effects of climate change. Being a planning practitioner in the Global South implies constantly dealing with the often-frustrating task of solving the urban issues of self-help settlements. To overcomplicate planning practice in the Global South, it is estimated that the consequences of climate change will have a disproportional impact in poor communities of the Global South, often living in self-help settlements. The combination of both issues, climate change and self-help settlements, is often deemed as not having a solution as self-help dwellers are irremediably locked in a poverty cycle that prevents them from facing the sources of their vulnerability (Hardoy & Romero Lankao, 2011; Romero Lankao & Qin, 2011; Satterthwaite, 2013c). At the same time, the very task of seeking the resilience of self-help settlements has reached the top of the global agenda of public policy with its inclusion in the Sustainable Development of the United Nations (UNGA, 2015). The findings of this research suggest that the irremediable vulnerability of self-help settlements is not necessarily a fact; and furthermore, that by understanding the actions of

networks of social capital engaging in the resilience of self-help settlements, some clues can be reached to inform planning practice in a more fruitful way. In this section the implications of this research for planning practice are considered.

Planning practice indeed has considered in the past the role of social capital in achieving resilience, and in community development (see: Woolcock, 1998), which is intrinsically related to the resilience of self-help settlements. However, social capital tends to be seen by planning practitioners as a magical instrument to foster resilience and development, that can serve as a substitute for state-driven actions, assigning local community actors an over responsibility in pulling themselves from vulnerability and poverty (see: Lister, 2015). Findings from this research show that even when community actors engaging in networks of social capital can provide some mechanisms to achieve resilience and development, this does not mean that it can happen in absence or substitution of the role of the state. Rather than that, the state, and its institutional framework can facilitate or hinder the effectiveness of social networks' operation in the achievement of resilience. Therefore, a relevant implication of this research for planning practice is the recognition of the role of the state, and a critical assessment of its institutional culture. An assessment of these issues might facilitate the productive use of networks of social capital for the resilience of self-help settlements. In other words, by doing this, more accountable governing (and governance) practices can be reached in benefit of the resilience of self-help settlements.

The second practice implication is also related to the understanding of the role of social capital in resilience by planning practitioners. It is often though that networks of social capital are the most relevant after the occurrence of an external shock, as networks of social capital can facilitate disaster management actions (see: Daniel P. Aldrich & Meyer, 2015; López-Marrero & Tschakert, 2011). Even when findings of this thesis do not contradict this assertion that focuses on the immediate actions of networks of social capital; they prove that the main role of networks of social capital is its longitudinal operation. The longitudinal operation of networks of social capital can facilitate immediate actions, and also locate the sources of vulnerability (environmental or institutional) that originated a crisis in the first place, allowing long term resilience objectives.

This brings us back to the need of a wider understanding of the role of networks of social capital in the resilience of self-help settlements in collaboration with the state, as argued by Bahadur and Tanner (2014). Findings of this thesis suggest that vertical collaboration between community-based actors and the state can facilitate the achievement of institutional transformations, forwarding the resilience of self-help settlements. However, this vertical collaboration does not necessarily happen naturally, as a web of vested interests may block pertinent transformations, thus constraining the achievement of local resilience in self-help settlements. In order to overcome these issues, planning practitioners may benefit from seeing social capital in terms of its productive possibilities. That is,

if practitioners understand how to transform locally based social capital to create transaction opportunities with the state, this may facilitate the productive operation of social capital for the benefit of the resilience of self-help settlements. In this way, planning practitioners may become trans-class facilitators for the scaling-up of social capital, which is critical for the productive operation of social capital in the benefit of poor communities, as suggested by Fox (1996).

In conclusion, this thesis suggests that the resilience of self-help settlements is possible. Networks of social capital can be of great influence in the achievement of resilience for such communities. Furthermore, planning practitioners can benefit from the findings of this thesis by engaging more critically in addressing the resilience of self-help settlements, through acknowledging the role of the state in making the engagement of local networks of social capital more productive. Finally, practitioners may reach better planning outcomes by engaging as trans-class links between local communities and the state, which would facilitate a better governance of the built environment.

Avenues for future research

Understanding the resilience of self-help settlements is a fertile research area that remains to be developed. In this thesis the contribution of social networks of social capital to the resilience of self-help settlements was explored, showing that such settlements can achieve urban resilience through the engagement of actors in networks of social capital. However, research still has to provide further evidence to understand the role of networks of social capital in the resilience of self-help settlements, in order to develop a further understanding on the issue to inform planning practice in a richer way. Thus, the following lines are suggestions of the possible avenues that future research can take. Three possible avenues of future academic enquiry are proposed. First, future research can build on findings of this thesis. Second, different cultural contexts of study are proposed. And finally, a wider testing of the theoretical framework should be undertaken.

Future research can build on the findings of this research in three possible ways. First, by carrying out comparative research considering as cases of study the municipalities around Neza, which share similarities in their physical and institutional context, yet different outcomes in terms of their resilience. Comparing the historic evolution of the urbanisation of those municipalities, using the same theoretical framework, and research methods as those used in this thesis, might enhance the understanding of the role of networks of social capital in the resilience of self-help settlements in the Mexican context. Second, the scope of the analysis of this research is local, focusing on the actions that participants of a network carried out to overcome the sources of their vulnerability and improve their well-being. As such, this investigation focused in the social and physical outcomes that the actions of networks of social capital had at the local level. Therefore, a relevant area of research could build on the findings of this investigation, and to scale-up the scope of analysis to understand how actions undertaken at the local scale affected the

resilience of the wider region. Third, a pertinent question that the findings of this research open up is that of how the resilience of some affects that of others. In this regard, findings of this research show that the use of social capital in political clientelism allowed the mobilisation of resources in favour of Neza residents. This in turn might have affected the resilience of others not engaged in such relations. Therefore, a relevant area for further enquiry is to investigate how these political relations of patrons and clients creates further unbalances in the resilience of the wider population. Perhaps this could be done through a comparative research looking at other municipalities of the State of Mexico, assessing whether the resilience of Neza affected the resilience of other municipalities that might have suffered from state resources being disproportionally mobilised to satisfy political clienteles.

The scope of this research is local, not just in terms of the municipal scale, but also in the contextual factors that might have influenced the results, such as culture-specific practices (i.e. Tequio, and compadrazgo). Therefore, future research should be carried out considering different institutional contexts in which self-help settlements might exist (e.g. African, Asian, communist, and post-communist contexts). Investigation should also consider testing the same research approach in different contexts. In this same category (conducting research in different contexts), another fertile area for future research might be the investigation of cases in which self-help settlements experienced catastrophic failure, in opposition to successful adaptation and transformation. By doing so, planning practice might benefit from understanding what culture-specific practices can be mobilised in favour of the resilience of self-help settlements.

Finally, a wider testing of the theoretical framework used in this research, under a multidisciplinary approach, should be another route for future scholarship. Future research should consider the resilience of self-help settlements from all the possible angles that the urban resilience framework understood from a social-ecological perspective offers: scales (neighbourhood, city and regional scales), abilities (flexibility, transformability, and adaptability), and dimensions (social and ecological); and all possible feedbacks between the elements that are part of the urban resilience framework. Conducting research in every possible combination of the scales of analysis, abilities, and dimensions in which the resilience of self-help settlements is achieved – or not–, in as many cases as possible, in collaboration with scholars from social, physical, and environmental disciplines should provide theoretical robustness to orient future planning practice.

In conclusion, this thesis has highlighted a critical area for further attention in planning practice: the role of networks of social capital in the resilience of self-help settlements. This research has identified that different interpretations of resilience may difficult the use of the concept of urban resilience in planning practice. However, at the same time, it is acknowledged that an increased understanding of the term, and its applicability in planning will benefit urban populations across the globe facing the challenges of cli-

mate change. At the same time, as findings of this thesis suggest, there is a social role in resilience, which can be explained through social capital theories, and which understanding might provide further clues on how the concept of resilience can be translated into planning practice.

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Appendix 1. Interview guide for interviews

This section presents the interview guide that was used to collect qualitative data, in the specific context of Neza. This interview guide is based on the topics proposed by Dudwick et al. (2006) as part of the World's Bank methodological guide to research social capital in context. The interview guide was developed and used in Spanish, and is translated here into English.

Community context

1. What are the main urban transformations that allowed Neza to overcome its environmental challenges?
2. What are the primary environmental obstacles that Neza faced?
3. How did the community decide how to rank them in terms of importance?
4. What was the result of such ranking exercise? [follow up question]

Groups and networks

5. What formal and informal groups, associations, and networks existed in the community?
6. What formal and informal groups, associations, and networks that existed in the community were related to overcoming environmental challenges?
7. How often were the groups activated?
8. Were informal groups based on occasions (e.g., project-oriented)?
9. What other triggers brought members of a group together?
10. Who played a leadership or mobilising role in the groups or networks?
11. What factors contributed to leadership within such groups (e.g., age, elections, education, socioeconomic status, or gender)?
12. Describe the diversity of roles within the groups or networks.
13. What networks or groups did people typically rely on to resolve environmental issues?
14. What institutions were relevant to resolve environmental issues?
15. What was exchanged between community groups and external institutions to resolve environmental issues?
16. Ask key respondents to identify and map their most significant networks. Estimate the number of people in each of the various networks.
17. Trust and reciprocity
18. What are the cultural and social norms of interaction (e.g., within the neighbourhood, larger community)?
19. To what institutions (formal or informal) does the settlement turn when facing environmental adversities? On whom do people rely for different kinds of assistance (e.g., goods, labour, cash, and finding employment)?
20. How is trust distributed in the community (e.g., specific networks or organisations)?

21. Do patterns of mistrust and suspicion exist between among groups or organisations?

Collective action and cooperation

22. How did national, regional, and/or local governance patterns affect collective action (were there constraints to organisation or, alternatively, did they demand informal support when public funds were inadequate, such as for sewage maintenance)?
23. Who initiated the activities? How were people mobilised?
24. Were some groups, neighbourhoods, and/or households more likely to exclude themselves or be excluded from collective activity, and if so, why?
25. What kinds of constraints limited people's ability or willingness to work together?
26. What were the social sanctions for violating expected norms of collective action in the community?
27. Describe examples of collective action that have taken place in the community (or a segment of the community). What was the course and outcome of these activities?
28. Empowerment and political action of social capital
29. How did laws constrain or facilitate the ability of citizens to exert influence over public institutions?
30. What kinds of formal and informal mechanisms were available to individuals and groups to demand accountability of local leaders and officials?
31. Which groups or segments of the community had the greatest influence over public institutions?
32. What were the sources of influence of these groups (e.g., group size, ability to mobilise members or expand member base, connections to power elite, economic importance)?
33. Which groups had the least influence over public institutions and why?
34. What was the relative impact, accessibility, and importance of these institutions vis-à-vis each other within the community?

Appendix 2. Roster of network participants

This section presents the roster of network participants that was presented to interviewees in the second part of the interview. This roster has been anonymised and translated to English.

SAMPLE OF THE LIST OF SOCIAL NETWORK PARTICIPANTS PREPARED WITH ARCHIVE SOURCES

Do you recognise any of the following names as participants of the social network that forwarded the achievement of water and drainage infrastructures, paved streets, public transport, municipal independence, and land tenure rights?

Please tick the box or boxes as appropriate.

Name*	Do you recognise this person?
Name 1	
Name 2	
Name 3	
Name….	

*Note: Names of network participants are not displayed for anonymity reasons.

Appendix 3. List of academic interviewees

Interviewee ID	Length of interview	Date of interview	Neza resident	Gender	Type of academic affiliation	Affiliation	Department
K-731	01:47:29	04/05/2016	●	Male	Researcher	*Universidad Nacional Autónoma de México, Facultad de Estudios Superiores - Aragón* (National Autonomous University of Mexico, School of Advanced Studies - Aragon)	*Centro de Investigación Multidisciplinaria - Aragón* (Centre of multidisciplinary research - Aragon)
K-728	01:07:58	16/03/2016		Male	Researcher	*Universidad Nacional Autónoma de México, Facultad de Estudios Superiores - Aragón* (National Autonomous University of Mexico, School of Advanced Studies - Aragon)	*Centro de Investigación Multidisciplinaria - Aragón* (Centre of multidisciplinary research - Aragon)
K-732	01:25:36	10/03/2016	●	Female	Researcher	*Instituto Politécnico Nacional* (National Polytechnic Institute)	*Centro Interdisciplinario de investigaciones y Estudios sobre Medio Ambiente y Desarrollo* (Center for Interdisciplinary Research on Environment and Development Studies)
K-734	00:16:02	08/03/2016	●	Male	Researcher	*Universidad Autónoma Chapingo* (Chapingo Autonomous University)	*Centro de Investigaciones Interdisciplinarias en Ciencia, Naturaleza, Sociedad y Cultura* (Center for Interdisciplinary Research in Science, Nature, Society and Culture)

Interviewee ID	Length of interview	Date of interview	Neza resident	Gender	Type of academic affiliation	Affiliation	Department
K-730*	01:06:12	03/03/2016	●	Male	Lecturer	*Tecnológico de Estudios Superiores Chimalhuacán* (Chimalhuacan Advanced Studies of Technology)	*Licenciatura y posgrado en administraci*ón (School of Management)
K-729	02:26:36	01/03/2016	●	Male	Researcher	*Instituto Politécnico Nacional* (National Polytechnic Institute)	*Escuela superior de ingenieria y arquitectura* (Higher School of Engineering and Architecture)
K-733	01:05:08	26/02/2016		Male	Researcher	*Instituto Politécnico Nacional* (National Polytechnic Institute)	*Sección de Estudios de Posgrado e Investigación - Escuela Superior de Ingeniería y Arquitectura* (Research and Postgraduate Studies - Higher School of Engineering and Architecture)

**The father of K-730 was part of the original list of the social network collected in archives. In archives, K-730's father appeared as a developer.*
Source: Author's elaboration.

Appendix 4. List of network participant interviewees

Interviewee ID	Length of interview	Date of interview	Type of actor	Present in the original list of participants	Interviewee description	Role in the network
C-113	-	-	Government actor	●	Government	Linking
A-65	02:03:59	09/05/2916	Neza resident	●	Community leader	Bridging
C-714	01:05:21	14/06/2016	Government actor		Community leader/Political	Linking
A-712	00:50:27	13/06/2016	Neza resident		Neighbourhood participant	Bonding
A-713	00:35:00	13/06/2016	Neza resident		Neighbourhood participant	Bonding
A-711	01:03:27	09/06/2016	Neza resident		Neighbourhood participant	Bonding
A-710	00:45:27	08/06/2016	Neza resident		Community leader (traders)	Linking
A-707	00:48:41	07/06/2016	Political/Neza resident		Political	Bridging
A-708	00:37:22	06/06/2016	Neza resident		Community leader (traders)	Linking
A-709	00:52:18	01/06/2016	Neza resident		Neighbourhood leader	Bridging
C-352	00:49:22	11/05/2016	Government actor	●	Political	Linking
C-423	01:17:44	05/05/2016	Government actor	●	Community leader/Political	Linking
A-715	01:11:54	04/05/2016	Neza resident		Community leader	Linking
A-735	00:22:27	04/05/2016	Neza resident		Neighbourhood participant	Bonding
A-716	00:54:11	02/05/2016	Neza resident		Neighbourhood leader	Bridging
A-717	01:26:22	29/04/2016	Neza resident		Community leader	Linking
C-451	01:06:00	27/04/2016	Government actor	●	Government	Linking
A-185	01:22:47	25/04/2016	Neza resident	●	Neighbourhood leader	Bridging
A-385	01:46:30	21/04/2016	Neza resident	●	Neighbourhood leader	Bridging
A-414	00:38:17	21/04/2016	Neza resident	●	Neighbourhood participant	Bonding
A-718	01:08:48	21/04/2016	Neza resident		Neighbourhood leader	Bridging
A-183	01:39:08	10/04/2016	Neza resident	●	Community leader	Linking

Interviewee ID	Length of interview	Date of interview	Type of actor	Present in the original list of participants	Interviewee description	Role in the network
A-720	01:21:44	08/04/2016	Neza resident		Community leader	Linking
C-415	01:04:54	07/04/2016	Government actor/ Neza resident	●	Community leader/Political	Linking
A-719	00:51:13	06/04/2016	Neza resident		Neighbourhood leader	Bridging
A-722	00:55:48	06/04/2016	Neza resident		Neighbourhood leader	Bridging
A-721	01:00:42	03/04/2016	Neza resident		Neighbourhood leader	Bridging
A-725	00:55:22	02/04/2016	Neza resident		Neighbourhood leader	Bridging
A-557	01:21:03	31/03/2016	Neza resident	●	Community leader	Bridging
C-723	01:28:03	30/03/2016	Government actor		Community leader/Political	Linking
A-296	01:10:35	28/03/2016	Neza resident	●	Neighbourhood leader	Bridging
A-668	01:49:47	19/03/2016	Neza resident	●	Community leader	Bridging
A-726	01:08:24	18/03/2016	Political/Neza resident		Political	Linking
A-727	01:32:49	14/03/2016	Political/Neza resident		Community leader (school teachers)	Linking
A-628	01:35:48	08/03/2016	Neza resident	●	Community leader	Bridging
A-724	00:59:11	02/03/2016	Neza resident		Neighbourhood leader	Bridging

Source: Author's elaboration.

Appendix 5. List of archive sources

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Problemas de transporte urbano (1955) juntas de mejoramiento moral [Problems of urban transport (1955) boards of moral improvement]. (1955). Comunicaciones y transporte [Communications and transportation], (13 (1955) UAE/V-1/E-20/ 5 FS, 9). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Problemática agua potable [Problems with drinking water]. (1959). Desarrollo urbano y obras públicas [Urban development and public works], (16 1959UAE/V32/ E571/2FS, 46). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Problemática del servicio de transporte de pasajeros 1974 [Problems of the passengers service 1974]. (1974). Comunicaciones y transporte [Communications and transportation], (13 (1974) UAE/V-1/E-11/ 5 FS, 9). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Problemática en el transporte de las colonia del ex-vaso de Texcoco 1954 [Problems in the transport of the colonies of the former Texcoco lake 1954]. (1954). Comunicaciones y transporte [Communications and transportation], (13 (1954) UAE/V-1/E-22/ 2 FS, 9, 151). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Proposición de rutas para el sistema de trolebuses Ciudad Neza. - DF [Proposal of routes for the trolleybus system Ciudad Neza. - DF]. (1971-1972). Comunicaciones y transporte [Communications and transportation], (13 (1971-1972) UAE/V-1/E-16/ 16 FS, 9). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Protección contra inundaciones 1985-1986 [Flood Protection 1985-1986]. (1985-1986). Desarrollo urbano y obras públicas [Urban development and public works], (16(1985-1986)UAE/V-4/E-43/ 34 F, 18). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Relación de fraccionadores de las colonias del lago de Texcoco [List of developers of the Texcoco lake colonies]. (1959). Expedientables nuevas adquisiciones [New acquisitions file]. Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Sección política del grupo creadores del municipio [Political section of the group creators of the municipality]. (1978). Desarrollo urbano y obras públicas [Urban development and public works], (16 1978 UAE/V24/E346/1F, 38). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

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Solicitud de audiencia colonia el Sol [El Sol colony hearing request]. (1959). Desarrollo urbano y obras públicas [Urban development and public works], (16 1959UAE/V32/E577/2FS, 46). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Solicitud de diversas obras colonia México [Request for various works México colony]. (1977). Desarrollo urbano y obras públicas [Urban development and public works], (16 1977 UAE/V24/E333/3F, 38). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Solicitud de drenaje en las colonia Aurora [Request for drainage in the Aurora colony]. (1972). Desarrollo urbano y obras públicas [Urban development and public works], (16 1972 UAE/V25/E359/7F, 39). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

"Solicitud de guarniciones y banquetas colonias Perla, Reforma y Loma Bonita [Request for kerbs and sidewalks Perla, Reforma and Loma Bonita colonies]". (1980). Desarrollo urbano y obras públicas [Urban development and public works], (16 1980 UAE/V24/E320/3F, 38). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

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Solicitud de no segregación de las colonias de la zona norte de Ciudad Neza [Request for non-segregation of the colonies of the northern zone of Neza city]. (1976). Desarrollo urbano y obras públicas [Urban development and public works], (16 1976 UAE/V26/E412/2F, 40). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Solicitud de pavimentación avenida Chimalhuacán y bordo de Xochiaca [Request for paving Chimalhuacán avenue and Bordo de Xochiaca]. (1975). Desarrollo urbano y obras públicas [Urban development and public works], (16 1975 UAE/V26/E408/4F, 40). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

"Solicitud de pavimentación colonia Atlacomulco Porvenir y Pavón [Request for paving Atlacomulco, Porvenir and Pavón colonies]". (1978). Desarrollo urbano y obras públicas [Urban development and public works], (16 1978 UAE/V24/E342/4F, 38). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Solicitud de pavimentación colonia Campestre [Request for paving Campestre colony]. (1977). Desarrollo urbano y obras públicas [Urban development and public works], (16 1977 UAE/V24/E325/6F, 38). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Solicitud de pavimentación colonia el Sol [Request for paving el Sol colony]. (1976). Desarrollo urbano y obras públicas [Urban development and public works], (16 1976 UAE/V26/E398/2F, 40). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Solicitud de pavimentación colonia las Águilas Federación de Colonos del Estado de México [Request for paving las Águilas colony Settlers' Federation of the State of Mexico]. (1977). Desarrollo urbano y obras públicas [Urban development and public works], (16 1977 UAE/V24/E328/2F, 38). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Solicitud de pavimentación en colonia el Sol y Juárez Pantitlán [Request for paving in el Sol and Juárez Pantitlán colonies]. (1976). Desarrollo urbano y obras públicas [Urban development and public works], (16 1976 UAE/V26/E395/3F, 40). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Solicitud de pavimentación Impulsora Popular Avícola [Request for paving in Impulsora Popular Avícola]. (1978). Desarrollo urbano y obras públicas [Urban development and public works], (16 1978 UAE/V24/E341/1F, 38). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Solicitud de pavimento principales avenidas [Request for pavement in main avenues]. (1976). Desarrollo urbano y obras públicas [Urban development and public works], (16 1976 UAE/V26/E401/14F, 40). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Solicitud pavimentación colonia Constitución del 57 1976 [Request for paving Constitución del 57 colony 1976]. (1976). Desarrollo urbano y obras públicas [Urban development and public works], (16 1976 UAE/V-26/E394/2F, 40). Centro de Información y Documentación de Nezahualcóyotl [Centre of Information and Documentation of Nezahualcóyotl], Nezahualcóyotl, State of Mexico, Mexico.

Appendix 6. Information sheet

INFORMATION SHEET

You will be given a copy of this information sheet. Please discuss the information below with the researcher if there is anything that is not clear or if you would like more information. It is up to you to decide whether to take part in the interview or not. If you do decide to take part you are still free to withdraw at any time and without giving a reason.

All data will be collected and stored in accordance with both the Mexican Federal Law for Protection of Personal Data in Possession of Private Parties, and the United Kingdom Data Protection Act 1998.

Who is conducting the research?

Manuel Alejandro Rivero Villar, research student at University College London, England [The Bartlett Scool of Planning, 14 Upper Woburn Place, London WC1H 0NN, England], is the researcher collecting your data. The person responsible for the use and protection of your personal data is the researcher's supervisor, Dr Catalina Turcu [Lecturer in Sustainable Development and Planning and Programme Director for MSc Sustainable Urbanism, The Bartlett Scool of Planning, 14 Upper Woburn Place, London WC1H 0NN, England].

What is the study about?

The study is called *"The role of social capital in the resilience of self-help settlements: The case of Nezahualcóyotl in the metropolitan area of Mexico City"*. It researches the contribution that community engagement might make to the urban transformation of self-help settlements in response to challenging environmental conditions. The objective is to document the role that the community had in driving the urban transformation of Ciudad Neza into a succesful settlement.

What personal data will be collected?

The researcher will conduct interviews with academics, and community leaders of Neza. These interviews will collect data on the activities that allowed Neza's inhabitants to transform their settlement: participation in collective activities (e.g. town meetings, and community labour) and the strategies undertaken (e.g. networking, and demonstrations).

Personal data that will be collected (acoording to Mexican legislation): name, surnames, date and place of birth, phone number, e-mail, level of education , voice (acustic record), and political practices and opinions.

How will the data be collected?

The data will be collected through one to one interviews between participants and the researcher. Interviews will be audio taped to help the researcher accurately capture respondent's insights in her own words. Interviews will be recorded only if explicit consent is given by the participant. Recorded interviews will be transcribed and the tape will then be wiped clear.

How will your personal data be used and protected?

Your data will not be shared with anyone, and will be anonymised. This means that your name will not be stored in the same files as your personal data; and both files will be password protected. The researcher will not share your data with anyone including other participants in the study. The tapes will only be heard by the researcher for the purpose of this study.

Once the data is anonymised and results are analysed, findings will be written down as a thesis that will be available to participants upon request. Findings might also be published as academic journal papers.

If you do not want your personal data to be used, it is your right to refuse to participate in the interview. During the interview it is your right to refuse to answer any question.

After the interview, you can also change your mind at any time and decide you want your personal data to be deleted. In this case you can simply contact the researcher who will delete all your personal data.

After completion of the research (estimate date of september 2018), your personal data will be deleted.

How can you access, modify, delete your personal data?

You can contact the researcher, Manuel Alejandro Rivero Villar, to ask for your personal data to be amended or deleted at any time, as well as to ask for further information on the research.

Contact details:
Phone number in México: [Telephone number in Mexico]
Phone number in England: [Telephone number in the UK]
Institutional email: [Institutional e-mail of the researcher]
Personal email: [personal e-mail of the researcher]
Postal address: [Postal address of the researcher in the UK]
Postal address of research supervisor: [Postal address of the researcher's supervisor]

This study has been approved by the UCL Research Ethics Committee (Project ID Number): 7193/001

Appendix 7. Consent form

CONSENT FORM

Title of Project: The role of social capital in the resilience of self-help settlements: The case of Nezahualcóyotl in the metropolitan area of Mexico City

Name of Researcher: Manuel Alejandro Rivero Villar

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my legal rights being affected.

3. I understand that my opinions will be audio taped to help the researcher to accurately capture my insights in my own words. If I feel uncomfortable with the recorder, I may ask that it be turned off at any time.

4. I agree to take part in the above mentioned study.

Name	Date	Signature taking consent

Appendix 8. Recruitment letters

SAMPLE RECRUITMENT E-MAIL FOR ACADEMICS

[Date]
[Interviewee Name]
Dear [Interviewee Name]:

My name is Alejandro Rivero, I am a PhD student at University College London, under the supervision of Dr Catalina Turcu (catalina.turcu@ucl.ac.uk). My research area is sustainable urban planning, and I am focusing my research on the contribution that community engagement might make to the urban transformation of self-help settlements in response to challenging environmental conditions. My case study is Ciudad Nezahualcoyotl.

As part of my research, I am conducting interviews with scholars whose research interests draw on [Ciudad Nezahualcoyotl, urban movements of Mexico City, the east region of Mexico City, and contemporary history of Mexico City]. Given your great experience in the area, interviewing you would be of great help for my research. This is why I respectfully ask you to grant me an interview.

I will be in Mexico conducting field work from January to May 2016. If that is convenient for you, we could carry out the interview during that time. It would last about an hour and would deal with your opinion on the process of urban transformation of Neza, as well as the actors involved.

I sincerely hope that you will consider participating in this important effort to document the process of urban transformation of Neza. Please feel free to contact me as specified below with any questions. An information sheet on the project is attached for your reference.

Sincerely,

Alejandro Rivero
Doctoral Researcher
The Bartlett School of Planning
University College London

Phone number in México: [Telephone number in Mexico]
Phone number in England: [Telephone number in the UK]
Institutional email: [Institutional e-mail of the researcher]
Personal email: [personal e-mail of the researcher]

SAMPLE RECRUITMENT LETTER (OR E-MAIL) FOR NETWORK PARTICIPANTS

[Date]
[Interviewee Name]
[Address]
[Interviewee Name]
Dear [Interviewee Name]:

My name is Alejandro Rivero, I am a PhD student at University College London, under the supervision of Dr Catalina Turcu (catalina.turcu@ucl.ac.uk). My research area is sustainable urban planning, and I am focusing my research on the contribution that community engagement might make to the urban transformation of self-help settlements in response to challenging environmental conditions. My case study is Ciudad Nezahualcoyotl.

As part of my research, I am conducting interviews with community leaders who played prominent roles in founding and shaping the transformation of Ciudad Nezahualcoyotl. Given your great involvement in this process, interviewing you would be of great help for my research. This is why I respectfully ask you to grant me an interview.

I will be in Mexico conducting field work from January to May 2016. If that is convenient for you, we could carry out the interview during that time. It would last about an hour and would deal with your experience in the process of urban transformation of Neza.

I sincerely hope that you will consider participating in this important effort to document the process of urban transformation of Neza. Please feel free to contact me as specified below with any questions. An information sheet on the project is attached for your reference.

Sincerely,

Alejandro Rivero
Doctoral Researcher
The Bartlett School of Planning
University College London

Phone number in México: [Telephone number in Mexico]
Phone number in England: [Telephone number in the UK]
Institutional email: [Institutional e-mail of the researcher]
Personal email: [personal e-mail of the researcher]

Appendix 9. List of interviewees and sampling strategy

			Snow ball sampling				
Interviewee ID	Type of actor	Present in the original list of participants	Academics	Other members of the network	Telephone directory	Information located in archive records	Other
A-183	Neza resident	●		●			
A-185	Neza resident	●		●			
A-296	Neza resident	●		●			
A-385	Neza resident	●		●			
A-414	Neza resident	●			●		
A-557	Neza resident	●		●			
A-628	Neza resident	●	●				
A-65	Neza resident	●				●	
A-668	Neza resident	●	●				
A-707	Political/ Neza resident		●				
A-708	Neza resident			●			
A-709	Neza resident			●			
A-710	Neza resident			●			
A-711	Neza resident			●			
A-712	Neza resident			●			
A-713	Neza resident			●			
A-715	Neza resident			●			
A-716	Neza resident			●			
A-717	Neza resident		●				
A-718	Neza resident			●			
A-719	Neza resident			●			
A-720	Neza resident			●			
A-721	Neza resident			●			
A-722	Neza resident			●			
A-724	Neza resident			●			
A-725	Neza resident			●			
A-726	Political/ Neza resident		●				
A-727	Political/ Neza resident			●			
A-735	Neza resident					●	

		Snow ball sampling					
Interviewee ID	**Type of actor**	**Present in the original list of participants**	**Academics**	**Other members of the network**	**Telephone directory**	**Information located in archive records**	**Other**
C-113	Government actor	●		●			Carlos Hank González cited in Benítez (1999)
C-352	Government actor	●				●	
C-415	Government actor/Neza resident	●		●			
C-423	Government actor	●	●				
C-451	Government actor	●					Professional acquaintance
C-714	Government actor			●			
C-723	Government actor		●				

Source: Author's elaboration

Appendix 10. Definition of themes and codes, number of contributing sources per theme and code, and number of references per theme and code

Themes and codes	Total contributing sources	Number of references	Description
Framing challenges	***36***	***577***	***Interviewees' perspective on the challenges that Neza had to face to become a resilient settlement.***
Environmental challenges	33	176	Interviewees' perspective on environmentally related challenges (i.e. meteorological, or site-related).
Institutional challenges	35	433	Challenges that emerged from the institutional framework in which Neza's resilience was achieved (institutional practises and lack of institutions).
PRI practises	31	185	Political practises related to the operation of PRI as unique party (clientelism, co-optation, corporatism, political exclusion).
Provincial practises	19	59	Institutional and peoples' practises of social exclusion and political underrepresentation towards Neza residents. Practises that exacerbated environmental challenges.
Uncertainty on property rights	25	140	Interviewees' perspectives on the uncertain property of the lands of Neza that defaulted the achievement of Neza's resilience.
Goals	***36***	***565***	***Set of collectively defined goals that contributed to the achievement of Neza's resilience.***
Definition of priorities	31	168	Interviewees' accounts on the procedures undertaken by the community to define collective priorities in relation with the achievement of urban resilience.
Strategic goals	34	314	Interviewees' accounts on the definition of institutional channels as means for the achievement of urban resilience.
Receding goals	23	99	Interviewees' understanding on the city as a receding goal, given its constant progress and sophistication of requirements.
Urbanisation as adaptation strategy	20	55	Interviewees' accounts on the understanding of the process of urbanisation as a strategy towards the achievement of increased resilience.
Group formation	***33***	***342***	***Strategies, procedures and drivers that helped the formation of Neza's social network.***

Themes and codes	Total contributing sources	Number of references	Description
Cosmopolitan city	12	15	Interviewees' account on the role that the diverse origin of Neza's early settlers as base for the formation of social networks.
Learn to organise	12	24	Interviewees' accounts on the process in which Neza residents realised that it was necessary to organise into networks, and the practises used to do it.
Role of ethnicity	11	41	Interviewees account on the role that the practises of Oaxacans as a distinctive ethnic group played in the formation of social networks.
Similar background	13	28	Interviewees understanding of the sources of their commonalities despite being from different ethnic groups (rural origin and urban marginality).
Group operation	***30***	***272***	***Distinctive mechanisms used for Neza's social networks to achieve collective goals.***
Being a leader	20	49	Distinctive features and behaviours that made ones (but not all) to engage in collective actions and become community leaders. And how this influenced the operation of the group.
Collective work	21	75	Interviewees accounts on the role that neighbours engaging in collective and reciprocal work in the operation of groups.
Density of organisations	12	21	Interviewees' accounts on the role that the distribution of members of different groups across the Neza's territory enabled -or hindered- the operation of the group.
Role of women	10	24	Interviewee's accounts on the importance of women's engagement in collective actions for the operation of the group.
Key moments	***33***	***197***	***Defining moments that changed the trajectory of Neza's resilience.***
A space in the city	20	47	Rural-urban migration and its impact on the resilience of Neza.
Land grab/ invasion	25	71	Attitudes towards the invasion of vacant land as a culminant moment towards Neza's resilience.
Strategic actions	16	81	Strategic actions undertaken by Neza's social network to achieve urban resilience.
Power	***32***	***320***	***Control of the agendas that enabled or hindered the resilience of Neza.***

Themes and codes	Total contributing sources	Number of references	Description
Always PRIistas	14	31	Role of belonging to a particular political party in the achievement of collectively constructed goals.
Everything was top-down	8	20	Understandings from the power on the role played by Neza's social network in the achievement of urban resilience.
Group size as power source	17	41	Understandings on the role that the increased number of participants in social networks as sources of power. And how this can be used to achieve collective goals.
Knowledge	12	46	Role of the control of technical knowledge in the achievement of urban resilience.
Who knows whom	6	27	Instrumental use of social relations in accessing power. And how these relations are used as a source of power on its own.
Social capital	***33***	***312***	***Rules of trust and reciprocity that are located in social networks and allow them to act collectively in pursue of various goals.***
Bad SC	9	26	Use of social capital for the advancement of goals that benefit only a few individuals, while affecting the rest of the network.
Bonding	13	31	Networks of homogeneous groups. Serves to cope with everyday life challenges.
Bridging	16	39	Extra community links allow groups to share information and act collectively towards shared objectives.
Horizontal communication	9	32	Communication strategies developed by bridging and bonding groups of social capital for the advancement of their collective goals.
Linking	21	146	Vertical connections between different groups of wealth and power, linking play a special role in community development.
Network's latent state	10	18	Attitudes and moments that lead to a pause of Network's activities.
The State and social capital	8	20	Use, control and development of networks of social capital by the State.
Vertical communication	10	40	Communication strategies developed by linking groups of social capital for the advancement of Neza's collective goals.

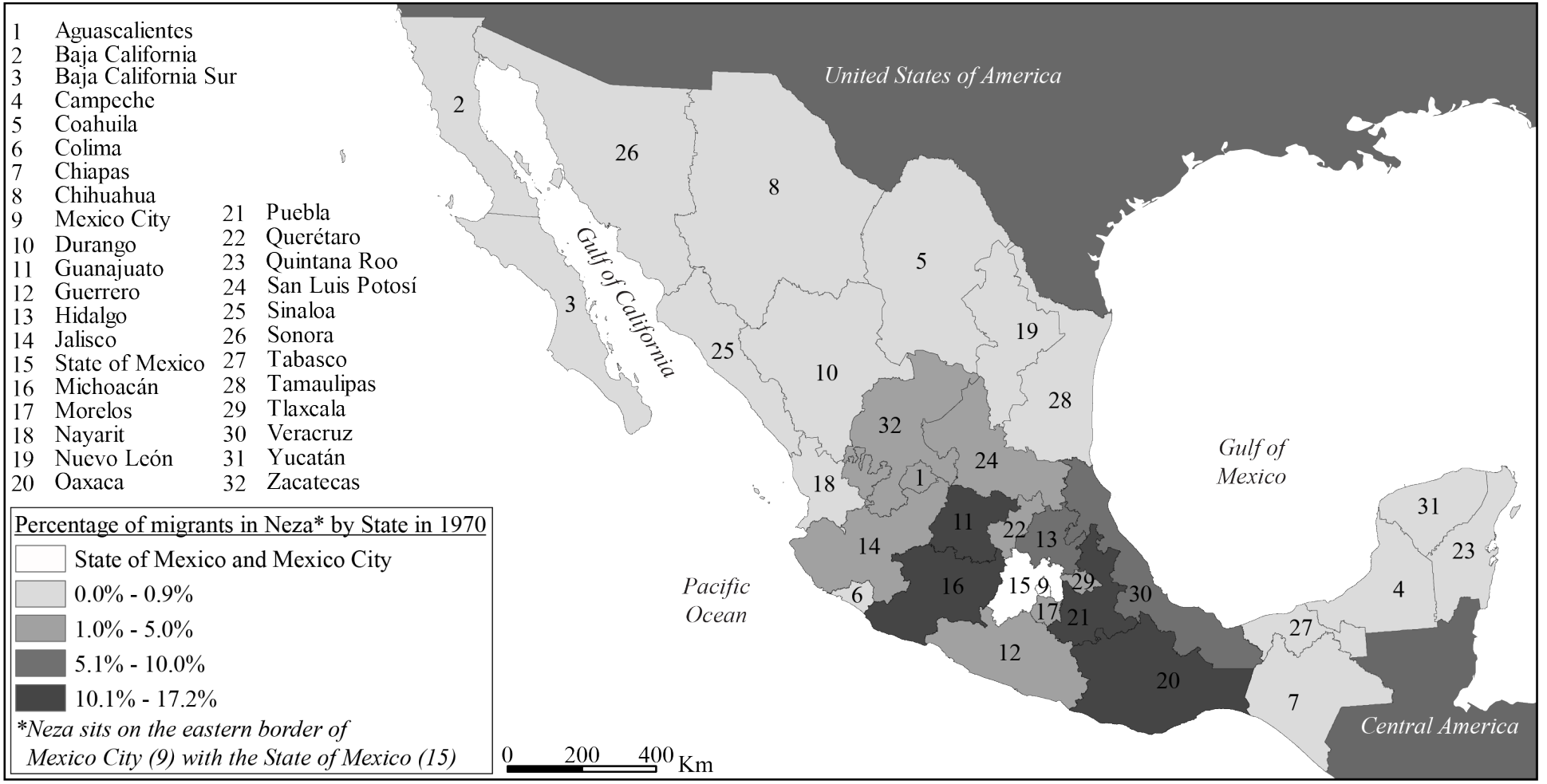
Source: Author's elaboration, partially based on Putnam (2000b); Woolcock (1998).

Appendix 11.State of origin of migrants living in Neza in 1970

State	Migrants	
	Total	%
1. Aguascalientes	1,854	1.2%
2. Baja California	553	0.3%
3. Baja California Sur	211	0.1%
4. Campeche	463	0.3%
5. Coahuila	770	0.5%
6. Colima	568	0.4%
7. Chiapas	1,167	0.7%
8. Chihuahua	798	0.5%
9. Mexico City	-	-
10. Durango	931	0.6%
11. Guanajuato	24,445	15.4%
12. Guerrero	7,937	5.0%
13. Hidalgo	11,917	7.5%
14. Jalisco	7,726	4.9%
15. State of Mexico	-	-
16. Michoacán	27,472	17.3%
17. Morelos	3,158	2.0%
18. Nayarit	197	0.1%
19. Nuevo León	571	0.4%
20. Oaxaca	21,262	13.4%
21. Puebla	20,404	12.8%
22. Querétaro	3,125	2.0%
23. Quintana Roo	57	0.0%
24. San Luis Potosí	3,070	1.9%
25. Sinaloa	274	0.2%
26. Sonora	256	0.2%
27. Tabasco	450	0.3%
28. Tamaulipas	1,064	0.7%
29. Tlaxcala	5,622	3.5%
30. Veracruz	8,124	5.1%
31. Yucatán	778	0.5%
32. Zacatecas	3,727	2.3%

Note: See Appendix 12 for a map of Mexican states
Source: Secretaría de Industria y Comercio (1971)

Appendix 12. Map of state of origin of migrants to Neza in 1970



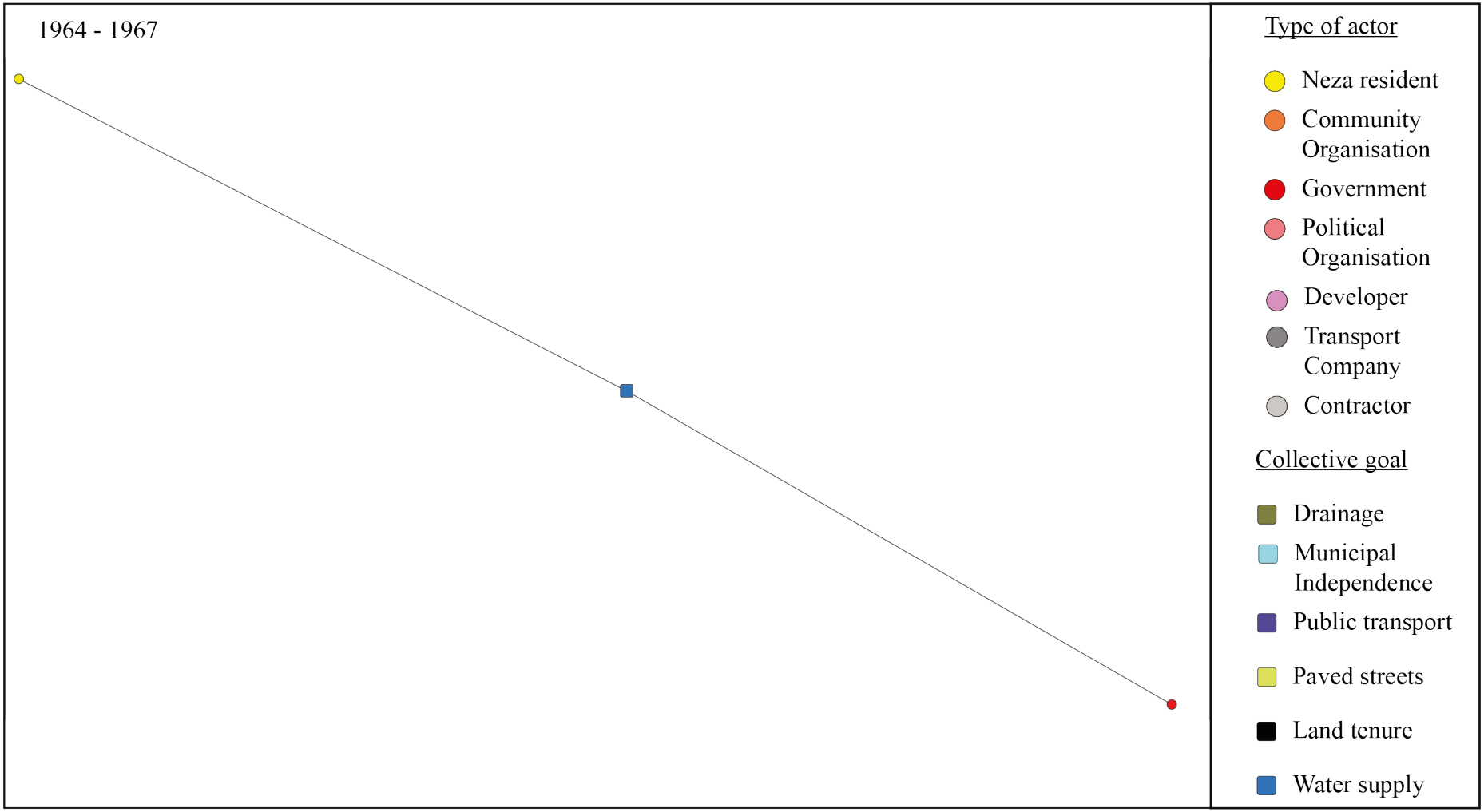
Source: Author's elaboration, using cartographic information from: INEGI (2010a), and census data from Secretaría de Industria y Comercio (1971)

Appendix 13. Indigenous languages spoken in Neza in 1970 by state

State	Indigenous language							
	Mayan	Mazahua	Nahuatl	Mixteco	Otomi	Purepecha	Totonaca	Zapoteco
4. Campeche	●							
6. Colima			●					
9. Mexico City			●					
10. Durango			●					
11. Guanajuato					●			
12. Guerrero			●	●				
13. Hidalgo			●		●			
14. Jalisco			●					
15. State of Mexico		●	●		●			
16. Michoacán		●	●		●	●		
17. Morelos			●					
18. Nayarit			●					
20. Oaxaca			●	●				●
21. Puebla			●	●	●		●	
22. Querétaro					●			
23. Quintana Roo	●							
24. San Luis Potosí			●					
27. Tabasco			●					
29. Tlaxcala			●		●			
30. Veracruz			●		●		●	
31. Yucatán	●							

Source: Author's elaboration, using information from Secretaría de Industria y Comercio (1971), and Instituto Nacional de Lenguas Indígenas (2008)

Appendix 14. Two-mode network, actors by collective goal 1964 – 1967



Source: Author's elaboration.